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OIPE JC174 APR 0 3 2001 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Re: Appeal to the Board of Patent Appeals and Interferences

In re PATENT application of | Group Art Unit: 2624

Application No. : 09/220,970 | Examiner: Chen, W.

Filed: 12/23/98

Date: April 3, 2001

Hon. Asst. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

OIPE JC174 APR 0 3 2001 PATENT & TRADEMARK OFFICE

1 [ ] **NOTICE OF APPEAL**: Applicant hereby appeals to the Board of Patent Appeals and Interferences from the decision (not Advisory Action) dated of the Examiner twice/finally rejecting claims

2 [X] **BRIEF** on appeal in this application attached in triplicate.

3 [X] An **ORAL HEARING** is respectfully requested under Rule 194 (due two months after Examiner's Answer -- unextendable).

4 [ ] Reply Brief is attached in triplicate (due two months after Examiner's Answer -- unextendable).

5 [X] "Small entity" verified statement filed: [ ] herewith. [X] previously.

6 **FEE CALCULATION**:		Large/Small Entity	
If box 1 above is X'd, see box 12 below first and decide: .... enter		$	$
If box 2 above is X'd, see box 12 below first and decide: .... enter		$ 155	$ 155
If box 3 above is X'd, see box 12 below first and decide: .... enter		$ 135	$ 135
If box 4 above is X'd, ... enter nothing		- 0 - (no fee)	
7. Original due date: September 11, 2000			
8. **Petition is hereby made** to extend the original due date to cover the date this response is filed for which the requisite fee is attached (1 months) (2 months) (3 months) (4 months) (5 months)	$ $ $ $ $945	945	
9. Enter any previous extension fee paid [ ] previously since above original due date (item 7); [ ] with concurrently filed amendment		-	
10. **Subtract line 9 from line 8 and enter: Total Extension Fee**			1,235
11. **TOTAL FEE ATTACHED =**			$Already Paid

12. [ ] *Fee NOT required if/since paid in prior appeal in which the Board of Patent Appeals and Interferences did not render a decision on the merits.

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. 50-0687/ 62-231 for which purpose a duplicate copy of this sheet is attached. **This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed.**

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OIPE JC174
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT Application of
Mills

Group Art Unit: 2721

Application No. 09/220,970

Examiner: B. Tadayon

Filed: 12/23/98

For: A METHOD AND SYSTEM FOR PATTERN RECOGNITION AND PROCESSING

* * * * *

April 3, 2001

APPEAL BRIEF

COPY

Hon. Asst. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

This is an appeal from the rejection of claims 51-322 of the subject application. This Appeal Brief is submitted in triplicate as required by 37 C.F.R. § 1.192 (a).

1. Real Party in Interest:

This application is wholly owned by the inventor, Dr. Randell L. Mills, who is the Appellant.

2. Related Appeals and Interferences:

There are no other appeals or interferences known to Appellant or the Appellant's legal representative that will directly affect or be directly affected by or otherwise have a bearing on the Board's decision in the pending appeal.

3. Status of Claims:

Claims 1-322 are under examinaton. Claims 1-50 have been cancelled. Claims 51-322 pending in this application.

The rejection of claims 51-322 is appealed. Please refer to the Appendix (1) for a copy of the claims under appeal as amended by the Amendment filed on February 9, 2001 and entered by the Examiner on page 2 of the Notification dated March 19, 2001.

The Amendment was filed to reduce the issues for appeal. In that Amendment, claim 267 has been amended to correct a typographical error by replacing the term "method" with - - computer-readable medium- -; claims 51 and 118 have been amended only to add an input and/or output step, as suggested by the Examiner, to address the Section 101 rejection; and Claims 83, 94, 137, 138, 142, 193, 204, 205, 243, 248 and 252 and the present specification have been amended to correct a minor typographical error by replacing the term "SQRT (N/a)" with the term "(SQRT N)/a."

4. Status of any Amendment Filed Subsequent to Final Rejection:

Since no Final Rejection has issued in this case, no amendments have been filed subsequent to a Final Rejection. The claims have been twice rejected which necessitated this appeal.

A Notice of Appeal was filed on July 11, 2000, along with the appropriate petition for a one-month extension and fee.

5. Explanation of Exhibits:

Exhibit 1: A copy of each claim and how they read on the specification and drawings in compliance with MPEP § 1206 "APPEAL BRIEF CONTENT," (5).

Exhibit 2: February 28, 2000 letter to Director Esther Kepplinger. This letter is submitted to detail some of the unusual actions the U.S. Patent Office has taken against Appellant in the prosecution of his other

pending patent applications. Because this letter is submitted only for this limited purpose, it cannot be considered "other new evidence" that must be submitted in a paper separate from the appeal brief. MPEP §1207.

Exhibit 3: January 19, 2001 letter to Director Esther Kepplinger. This letter is submitted to detail some of the unusual actions the U.S. Patent Office has taken against Appellant in the prosecution of his other pending patent applications. Because this letter is submitted only for this limited purpose, it cannot be considered "other new evidence" that must be submitted in a paper separate from the appeal brief. MPEP §1207.

Exhibit 4: Siebert, W. McC., Circuits, Signals, and Systems, The MIT Press, Cambridge, Massachusetts, (1986), pp. 471-502, cited on page 106, lines 3-4 of the present application. Since the Examiner has already been made aware of this publication, it cannot be considered "other new evidence" that must be submitted in a paper separate from the appeal brief. MPEP §1207

6. Concise Explanation of the Invention:

An embodiment of the present invention is concisely explained in easy to follow flow charts illustrated in Figs. 1-5 and 18-21E of the specification. To the extent further explanation is required, the present invention will be described with reference to these flow charts without being limited thereto. A further concise explanation of the invention is provided in the section below responding to the rejection under 35 U.S.C. § 112, first paragraph, in which support and definitions for numerous claim terms are provided.

MPEP §1206, "APPEAL BRIEF CONTENT," (5) "Summary of Invention," page 1200-8, states that "it is preferable to read the appealed claims on the specification and any drawing." To facilitate ease of reading, only the independent claims have been

discussed in this section with reference to the Figs. A complete copy of each appealed claim and a reading of each claim on the specification is set forth in Exhibit 1. Appellant emphasizes that this reading of the claims in no way limits the claims to any particular embodiment disclosed in the specification or imposes any other restriction on the scope of the claims.

As recited in amended herewith claim 51, the invention provides a method for recognizing a pattern in information comprising data, the method comprising:

inputting data;

(Fig. 2, "Data", described at page 8, line 20)

encoding data as parameters of a plurality of Fourier components in Fourier space;

(Fig. 2, processor (22), described at page 8 lines 21-22)

adding at least two of said Fourier components together to form at least one Fourier series in Fourier space;

(Fig. 2 described at page 13 lines 4-6)

sampling at least one of said Fourier series in Fourier space with a filter to form a sampled Fourier series;

(Fig. 2, filter 34, described at page 13 lines 7-10)

modulating said sampled Fourier series in Fourier space with said filter to form a modulated Fourier series;

(Fig. 2, filter 34, described at page 13 lines 7-10)

determining a spectral similarity between said modulated Fourier series and another Fourier series;

(Fig. 2, spectral similarity analyzer 36, described at page 13 lines 10-15)

determining a probability expectation value based on said spectral similarity;

(Fig. 2, probability expectation analyzer 38, described at page 13 lines 14-17)

generating a probability operand based on said probability expectation value;

(Fig. 2, probability operand generator 40, described at page 13 lines 17-20)

selecting a desired value for said probability operand, wherein recognition of a pattern in said information is obtained when said probability operand having said desired value; and

(Fig. 2, described on page 13, lines 20-26, in this disclosed example, the desired probability operand value was selected to be one, but can be any value desired by the user)

outputting a recognized pattern.

(Fig. 2, described on page 13, lines 20-26, when the desired probability operand value is a desired value, a pattern is recognized and can be outputted as recognized. In the particular disclosed example on page 13, the recognized pattern is outputted in a manner such that the Fourier series is combined with said another Fourier series to a provide string of recognized information represented by the Fourier series (which is recited in dependent claim 52). The recognized string can be increased in size as desired by repeating the steps of the method. Recognition is also referred to as "association" or "associated information" in the application.)

Amended herewith claim 118 provides a method for recognizing a pattern in information, the method comprising:

inputting information;

(Fig. 2, "Data", described at page 8, line 20)

representing the information as a plurality of Fourier series in Fourier space;

(Fig. 2, processor (22), described at page 8 lines 21-22)

forming associations between at least two of the Fourier series by modulating and sampling the Fourier series with filters and by coupling the filtered Fourier series based on a probability distribution, wherein when at least two of the Fourier series have been associated recognition of a pattern in the information is achieved; and

(Fig. 2, described on page 13, lines 5-26)

outputting a recognized pattern in the information.

(Fig. 2, described on page 13, lines 20-26, when the desired probability operand value is a desired value, a pattern is recognized and can be outputted as recognized. In the particular disclosed example on page 13, the recognized pattern is outputted in a manner such that the Fourier series containing the recognized pattern is combined with said another Fourier series to a provide string of recognized information represented by the Fourier series

(which is recited in dependent claim 120). The recognized string can be increased in size as desired by repeating the steps of the method.)

An example of claim 127 is disclosed on page 16, line 16 to page 18, line 21. The italicized reference numbers refer to Fig. 4. Claim 127 provides a method for recognizing a pattern in information and establishing an order formatted pattern in information with respect to standard ordered information, the method comprising:

a.) obtaining a string comprising a sum of Fourier series from a memory, said string representing information;

(string memory section 44)

b.) selecting at least two filters from a selected set of filters;

(two filters 48 and 50 from a set of filters 52)

c.) sampling the string with the filters such that each of the filters produces a sampled Fourier series, each Fourier series comprising a subset of the string;

d.) modulating each of the sampled Fourier series in Fourier space with the corresponding selected filter such that each filter produces an order formatted Fourier series;

e.) adding the order formatted Fourier series produced by each filter to form a summed Fourier series in Fourier space;

f.) obtaining an ordered Fourier series from the memory;

(high level memory section 54)

g.) determining a spectral similarity between the summed Fourier series and the ordered Fourier series;

(spectral similarity analyzer 56)

h.) determining a probability expectation value based on the spectral similarity;

(probability expectation value analyzer 58)

i.) generating a probability operand based on the probability expectation value;

(probability operand generator 60)

j.) repeating steps b-i until the probability operand has a desired value, when the probability operand has a desired value a pattern in information has been recognized and an order formatted pattern in the information has been established;

(Processor 42 determines the value of the probability operand. The desired value in the disclosed example on pages 16-18 is one, but can be any value as desired by the user.

When the probability operand determined by processor 42 is equal to the desired value a pattern has been recognized.)

k.) storing the summed Fourier series to an intermediate memory;

(intermediate memory section 62)

l.) removing the selected filters from the selected set of filters to form an updated set of filters;

(set of filters 52)

m.) removing the subsets from the string to obtain an updated string;

n.) selecting an updated filter from the updated set of filters;

(selecting updated filter 62 from set of filters 52)

o.) sampling the updated string with the updated filter to form a sampled Fourier series comprising a subset of the string;

p.) modulating the sampled Fourier series in Fourier space with the corresponding selected updated filter to form an updated order formatted Fourier series;

q.) recalling the summed Fourier series from the intermediate memory;

(intermediate memory section 62)

r.) adding the updated order formatted Fourier series to the summed Fourier series from the intermediate memory to form an updated summed Fourier series in Fourier space;

s.) obtaining an updated ordered Fourier series from the high level memory;

(high level memory section 54)

t.) determining a spectral similarity between the updated summed Fourier series and the updated ordered Fourier series;

u.) determining a probability expectation value based on the spectral similarity;

v.) generating a probability operand based on the probability expectation value;

w.) repeating steps n-v until the probability operand has a desired value or all of the updated filters have been selected from the updated set of filters, when the probability operand has a desired value a pattern in information has been recognized an order formatted pattern in the information has been established;

(processor 42)

x.) if all of the updated filters have been selected before the probability operand has a desired value, then clearing the intermediate memory and returning to step b;

y.) if the probability operand has a desired value, then storing the updated summed Fourier series to the intermediate memory;

z.) repeating steps l-y until one of the following set of conditions is satisfied: the updated set of filters is empty, or the remaining subsets of the string of step m.) is nil; and

(processor 42)

aa.) storing the Fourier series in the intermediate memory in the high level memory. *(high level memory section 54)*

An example of claim 156 is disclosed at page 7, lines 11-33, and page 23, lines 8-21. The italicized reference numbers refer to Fig. 1. Claim 156 provides a system *(10)* for recognizing a pattern in information comprising data and establishing an order formatted pattern in information, the system comprising:

an input layer *(12)* that receives data representative of physical characteristics or representations of physical characteristics within an input context of the physical characteristics and transforms the data into a Fourier series in Fourier space wherein the input context is encoded in time as delays corresponding to modulation of the Fourier series at corresponding frequencies;

a memory *(20)* comprising a set of initial ordered Fourier series;

an association layer *(14)* that receives a plurality of the Fourier series in Fourier space from the memory, recognizes a pattern in information represented by the Fourier series, forms a string comprising a sum of Fourier series, and stores the string in memory;

a string ordering layer *(16)* that receives the string and at least one ordered Fourier series from the memory, orders the Fourier series contained in the string by establishing an order formatted pattern in information to form an ordered string, and stores the ordered string in memory; and

a predominant configuration layer *(18)* that receives multiple ordered strings from the memory, forms complex ordered strings from the ordered strings, stores the complex ordered strings to the memory, and activates the components of any of the layers of the system to recognize a pattern in information and establish an order formatted pattern in information.

An example of claim 157 is disclosed at page 21, line 9 to page 22, line 33. The italicized reference numbers refer to Fig. 5. Claim 157 provides a method of recognizing a pattern in information, the method comprising:

a.) generating an activation probability parameter based on a prior activation probability parameter and a weighting based on an activation rate of the corresponding component;
(probability parameter generator 66)

b.) storing the activation probability parameter in memory *(20)*;

b.) generating a probability operand based on the activation probability parameter;
(activation probability operand generator 70)

d.) if said probability operand is a desired value, activating any component of one or more of the group consisting of an input layer *(12)*, an association layer *(14)*, a string ordering layer *16)*, and a predominant configuration layer *(18)*, the activation being based on the activation probability parameter, wherein a pattern in information is recognized when said probability operand is said desired value;

e.) repeating steps a-d until a pattern is recognized in the information.

An example of claim 160 is disclosed on page 8, lines 19-23, page 13, lines 1-26, and page 23, lines 8-21, and Fig. 2. Claim 160 provides a computer-readable medium on which is stored a computer program for providing a method for recognizing a pattern in information comprising data, the computer program comprising instructions which, when executed by a computer, perform the steps of:

encoding data as parameters of a plurality of Fourier components in Fourier space;

(Fig. 2, processor (22), described at page 8 lines 21-22)

adding at least two of said Fourier components together to form at least one Fourier series in Fourier space;

(Fig. 2 described at page 13 lines 4-6)

sampling at least one of said Fourier series in Fourier space with a filter to form a sampled Fourier series;

(Fig. 2, filter 34, described at page 13 lines 7-10)

modulating said sampled Fourier series in Fourier space with said filter to form a modulated Fourier series;

(Fig. 2, filter 34, described at page 13 lines 7-10)

determining a spectral similarity between said modulated Fourier series and another Fourier series;

(Fig. 2, spectral similarity analyzer 36, described at page 13 lines 10-15)

determining a probability expectation value based on said spectral similarity;

(Fig. 2, probability expectation analyzer 38, described at page 13 lines 14-17)

generating a probability operand based on said probability expectation value; and

(Fig. 2, probability operand generator 40, described at page 13 lines 17-20)

selecting a desired value for said probability operand, wherein recognition of a pattern in said information is obtained when said probability operand having said desired value.

(Fig. 2, described on page 13, lines 20-26, in this disclosed example, the desired probability operand value was selected to be one, but can be any value desired by the user. When the desired probability operand value is a desired value, a pattern is recognized. In the particular disclosed example on page 13, the Fourier series containing the recognized pattern is combined with said another Fourier series to a provide string of recognized information represented by the Fourier series (which is recited in dependent claim 162). The recognized string can be increased in size as desired by repeating the steps of the method. Recognition is also referred to as "association" or "associated information" in the application.)

An example of claim 228 is disclosed on page 8, lines 21-22, page 13, lines 5-26, and page 23, lines 8-21. Claim 228 provides a computer-readable medium on which is stored a computer program for providing a method for recognizing a pattern in information, the computer program comprising instructions which, when executed by a computer, perform the steps of:

representing the information as a plurality of Fourier series in Fourier space; and

(Fig. 2, processor (22), described at page 8 lines 21-22)

forming associations between at least two of the Fourier series by modulating and sampling the Fourier series with filters and by coupling the filtered Fourier series based on a

probability distribution, wherein when at least two of the Fourier series have been associated recognition of a pattern in the information is achieved.

(Fig. 2, described on page 13, lines 5-26, when the desired probability operand value is a desired value, a pattern is recognized. In the particular disclosed example on page 13 the Fourier series containing the recognized pattern is combined with said another Fourier series to a provide string of recognized information represented by the Fourier series (which is recited in dependent claim 230). The recognized string can be increased in size as desired by repeating the steps of the method.)

A non-limiting example of claim 237 is disclosed on page 16, line 16 to page 18, line 21, and page 23, lines 8-21. The italicized reference numbers refer to Fig. 4. Claim 237 provides a computer-readable medium on which is stored a computer program for providing a method for recognizing a pattern in information and establishing an order formatted pattern in information with respect to standard ordered information, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) obtaining a string comprising a sum of Fourier series from a memory, said string representing information;

(string memory section 44)

b.) selecting at least two filters from a selected set of filters;

(two filters 48 and 50 from a set of filters 52)

c.) sampling the string with the filters such that each of the filters produces a sampled Fourier series, each Fourier series comprising a subset of the string;

d.) modulating each of the sampled Fourier series in Fourier space with the corresponding selected filter such that each filter produces an order formatted Fourier series;

e.) adding the order formatted Fourier series produced by each filter to form a summed Fourier series in Fourier space;

f.) obtaining an ordered Fourier series from the memory;

(high level memory section 54)

g.) determining a spectral similarity between the summed Fourier series and the ordered Fourier series;

(spectral similarity analyzer 56)

h.) determining a probability expectation value based on the spectral similarity;

(probability expectation value analyzer 58)

i.) generating a probability operand based on the probability expectation value;

(probability operand generator 60)

j.) repeating steps b-i until the probability operand has a desired value, when the probability operand has a desired value a pattern in information has been recognized and an order formatted pattern in the information has been established;

(Processor 42 determines the value of the probability operand. The desired value in the disclosed example on pages 16-18 is one, but can be any value as desired by the user. When the probability operand determined by processor 42 is equal to the desired value a pattern has been recognized.)

k.) storing the summed Fourier series to an intermediate memory;

(intermediate memory section 62)

l.) removing the selected filters from the selected set of filters to form an updated set of filters;

(set of filters 52)

m.) removing the subsets from the string to obtain an updated string;

n.) selecting an updated filter from the updated set of filters;

(selecting updated filter 62 from set of filters 52)

o.) sampling the updated string with the updated filter to form a sampled Fourier series comprising a subset of the string;

p.) modulating the sampled Fourier series in Fourier space with the corresponding selected updated filter to form an updated order formatted Fourier series;

q.) recalling the summed Fourier series from the intermediate memory;

(intermediate memory section 62)

r.) adding the updated order formatted Fourier series to the summed Fourier series from the intermediate memory to form an updated summed Fourier series in Fourier space;

s.) obtaining an updated ordered Fourier series from the high level memory;

(high level memory section 54)

t.) determining a spectral similarity between the updated summed Fourier series and the updated ordered Fourier series;

u.) determining a probability expectation value based on the spectral similarity;

v.) generating a probability operand based on the probability expectation value;

w.) repeating steps n-v until the probability operand has a desired value or all of the updated filters have been selected from the updated set of filters, when the probability operand has a desired value a pattern in information has been recognized an order formatted pattern in the information has been established;

(processor 42)

x.) if all of the updated filters have been selected before the probability operand has a desired value, then clearing the intermediate memory and returning to step b;

y.) if the probability operand has a desired value, then storing the updated summed Fourier series to the intermediate memory;

z.) repeating steps l-y until one of the following set of conditions is satisfied: the updated set of filters is empty, or the remaining subsets of the string of step m.) is nil; and

(processor 42)

aa.) storing the Fourier series in the intermediate memory in the high level memory.

(high level memory section 54)

An example of claim 266 is disclosed on page 21, line 9 to page 22, line 33 and page 23, lines 8-21, referring to Fig. 5. Claim 266 provides a computer-readable medium on which is stored a computer program for providing a method for recognizing a pattern in information and establishing an order formatted pattern in information, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) recording ordered strings comprising Fourier series to a high level memory, said Fourier series representing information;

(high level memory section 54)

b.) forming association between Fourier series of the ordered strings to form complex strings and recognizing a pattern in information;

(association layer 14)

c.) ordering the Fourier series of the complex strings to form complex ordered strings representing recognized information and establishing an order formatted pattern in information, and

(string ordering layer 16)

d.) storing the complex ordered strings to the high level memory.

(complex ordered string section 72, high level memory section 54)

An example of claim 267 is disclosed on page 21, line 9 to page 22, line 33 and page 23, lines 8-21, referring to Fig. 5. Claim 267 provides a computer-readable medium on which is stored a computer program for providing a method for recognizing a pattern in information comprising data and forming a predominant configuration, the computer program comprising instructions which, when executed by a computer, perform the steps of:

a.) generating an activation probability parameter based on a prior activation probability parameter and a weighting based on an activation rate of the corresponding component;

(activation probability parameter generator 66)

b.) storing the activation probability parameter in memory;

(memory 20)

c.) generating a probability operand based on the activation probability parameter;

(activation probability operand generator 70)

d.) if said probability operand is a desired value, activating any component of one or more of the group consisting of an input layer, an association layer, a string ordering layer, and a predominant configuration layer, the activation being based on the activation probability parameter, wherein recognition of a pattern in information is achieved when said probability operand is said desired value, and

(input layer 12, association layer 14, string ordering layer 16, predominant configuration layer 18, while the desired value is one in the disclosed example, any suitable value can be selected by the user)

e.) repeating steps a-d to form a predominate configuration.

An example of claim 270 is disclosed at page 7, lines 11-33, and page 23, lines 8-21. The italicized reference numbers refer to Fig. 1. Claim 270 provides a computer program product for recognizing a pattern in information for use in a computer including a central processing unit and a memory, the memory maintaining a set of initial ordered Fourier series, the computer program product comprising:

a computer readable medium;

program code means embodied in the computer readable medium, the program code means comprising:

means for receiving data representative of physical characteristics or representations of physical characteristics within an input context of the physical characteristics and transforming the data into a Fourier series in Fourier space wherein the input context is

encoded in time as delays corresponding to modulation of the Fourier series at corresponding frequencies;

(input layer 12)

means for receiving a plurality of the Fourier series in Fourier space including at least one ordered Fourier series from the memory, forming a string comprising a sum of the Fourier series and storing the string in memory;

(association layer 14, memory 20)

means for retrieving the string from memory, ordering the Fourier series contained in the string to form an ordered string and storing the ordered string in memory; and

(string ordering layer 16)

means for retrieving multiple ordered strings from the memory, forming complex ordered strings from the ordered strings and storing the complex ordered strings to the memory.

(predominant configuration layer 18)

An example of claim 271 is disclosed at page 1, line 32 to page 2, line 14 and page 21, line 9 to page 23, line 36. The italicized reference numbers refer to Fig. 5. Claim 271 provides a method of recognizing a pattern in information comprising data and establishing an order formatted pattern in information, the method comprising:

encoding inputted data as a plurality of Fourier components in Fourier Space and form a plurality of Fourier series from said Fourier components, said Fourier series representing information comprising data and input context;

associating said plurality of Fourier series with each other according to spectral similarities between said plurality of Fourier series to form a string, said string being a sum of associated plurality of Fourier series;

ordering said plurality of Fourier series within said string based on relative degree of association of order formatted subsets of said string with relevant aspects of a standard ordered string;

(predominant configuration layer 18 receives ordered strings from the high level memory section 54 and form more complex ordered strings)

assigning an activation probability parameter to each of said plurality of Fourier components and to each of said plurality of Fourier series to produce a predominant configuration string, generating a probability operand based on said activation probability parameter, said probability operand determining whether an activation of any one of said plurality of Fourier component and said plurality of Fourier series is to cause an activation of an associated another of said plurality of Fourier components and said plurality of Fourier series from said ordered string; and

(the predominant configuration layer 18 includes an activation probability parameter generator 66)

storing said predominant configuration string in a memory, thereby a pattern in newly inputted information can be recognized.

(memory 20)

An example of claim 281 is disclosed at page 7, lines 11-33 and page 23, lines 8-26. The italicized reference numbers refer to Fig. 1. Claim 281 provides a system *(10)* for recognizing a pattern in information comprising data, the method comprising:

an input layer *(12)* operable to receive said data, and to encode said received data as parameters of a plurality of Fourier series in Fourier space, said plurality of Fourier series including input context of said data;

a memory *(20)* comprising a set of initial ordered Fourier series;

an association layer *(14)* operable to add associated Fourier series together to form a string;

an ordering layer *(16)* operable to order said string based on relative degree of association of order formatted subsets of said string with relevant aspects of characteristics with respect to at least one of said initial ordered Fourier series to form an ordered string;

a predominant configuration layer *(18)* for receiving said ordered string and for assigning an activation probability parameter to each of said plurality of Fourier series to produce a predominant configuration string, generating a probability operand based on

said activation probability parameter, said probability operand determining whether an activation of any one of said plurality of Fourier components and said plurality of Fourier series is to cause an activation of an associated another one of said plurality of Fourier components or Fourier series; and

a memory *(20)* adapted to store said predominant configuration string, said predominant configuration string allowing a determination of a relative association of a newly inputted information to said inputted information already processed, thereby recognition of a pattern in said information can be recognized.

An example of claim 285 is disclosed at page 1, line 32 to page 2, line 14 and page 21, line 9 to page 23, line 36. The italicized reference numbers refer to Fig. 5. Claim 285 provides a method of recognizing a pattern in information comprising data, the method comprising:

providing an input layer operable to receive data;

providing an association layer operable to add associated portions of said data together to form a string;

providing an ordering layer operable to order said string based on a relative degree of association of order formatted subsets of said string with relevant aspects of information of a standard string to form an ordered string;

(predominant configuration layer 18 receives ordered strings from the high level memory section 54 and forms more complex ordered strings)

providing a predominant configuration layer operable to receive a plurality of ordered strings to form a complex ordered string therefrom;

assigning an activation probability parameter to each of said input layer, said association layer, said ordering layer and said predominant configuration layer, said activation probability parameter being determined based on a historical value of said activation probability parameter and an activation rate of respective ones of said input layer, said association layer, said ordering layer and said predominant configuration layer;

(the predominant configuration layer 18 includes an activation probability parameter generator 66)

generating a probability operand based on the activation probability parameter; and

(activation probability operand generator 70)

activating one or more of said input layer, said association layer, said ordering layer, said predominant configuration, said ordering layer, said predominant configuration layer, and said association layer if said probability operand has a desired value, whereby a pattern in said information is recognized according to a historical associative pattern in said data.

(input layer 12, association layer 14, string ordering layer 16, predominant configuration layer 18, while the desired value is one in the disclosed example, any suitable value can be selected by the user)

An example of claim 290 is disclosed on page 2, lines 15-33, page 8, line-25, page 13, lines1-26, and page 23, lines 8-26, referring to Fig. 2. Claim 290 provides a computer readable medium having stored thereon a computer program to implement a method of recognizing a pattern in information comprising data, said computer program comprising a plurality of codes for executing the steps of:

encoding said data as parameters of a plurality of Fourier components in Fourier space;

(Fourier transform processor 22, described on page 8, line 20)

adding said plurality of Fourier components together to form a plurality of Fourier series in Fourier space, said plurality of Fourier series representing inputted information;

(page 13, lines 4-6)

sampling at least one of said plurality of Fourier series in Fourier space with a filter to form a sampled Fourier series;

(filter 34, described at page 13, lines 7-10)

modulating said sampled Fourier series in Fourier space with said filter to form a modulated Fourier series;

(filter 34, described at page 13, lines 7-10)

determining a spectral similarity between said modulated Fourier series and another one of said plurality of Fourier series;

(spectral similarity analyzer 36, described at page 13, lines 10-15)

determining a probability expectation value based on said spectral similarity;

(probability expectation analyzer 38, described at page 13, lines 14-17)

generating a probability operand based on said probability expectation value; and

(probability operand generator 40, described at page 13, lines 17-20)

adding said modulated Fourier series and said another Fourier series, if said probability operand has a desired value, to form a string of Fourier series in Fourier space, said string representing an association between Fourier series to thereby allow recognition of a pattern in the information.

(described on page 13, lines 20-26, when the desired probability operand value is a desired value, one in this example, a pattern is recognized and can be outputted as recognized. In the particular disclosed example on page 13, the recognized pattern is outputted in a manner such that the Fourier series is combined with said another Fourier series to a provide string of recognized information represented by the Fourier. The recognized string can be increased in size as desired by repeating the steps of the method.)

A non-limiting example of claim 294 is disclosed on page 16, line 16 to page 18, line 21, and page 23, lines 8-26. The italicized reference numbers refer to Fig. 4. Claim 294 provides a method for recognizing a pattern in information and establishing an order formatted pattern in information with respect to standard ordered information, the method comprising:

b.) obtaining a string comprising a sum of Fourier series from a memory, said string representing information;

(string memory section 44)

b.) selecting at least two filters from a selected set of filters;

(two filters 48 and 50 from a set of filters 52)

c.) sampling the string with the filters such that each of the filters produces a sampled Fourier series, each Fourier series comprising a subset of the string;

d.) modulating each of the sampled Fourier series in Fourier space with the corresponding selected filter such that each filter produces an order formatted Fourier series;

e.) adding the order formatted Fourier series produced by each filter to form a summed Fourier series in Fourier space;

f.) obtaining an ordered Fourier series from the memory;

(high level memory section 54)

g.) determining a spectral similarity between the summed Fourier series and the ordered Fourier series;

(spectral similarity analyzer 56)

h.) determining a probability expectation value based on the spectral similarity;

(probability expectation value analyzer 58)

i.) generating a probability operand based on the probability expectation value;

(probability operand generator 60)

j.) repeating steps b-i until the probability operand has a desired value, when the probability operand has a desired value a pattern in information has been recognized and an order formatted pattern in the information has been established;

(Processor 42 determines the value of the probability operand. The desired value in the disclosed example on pages 16-18 is one, but can be any value as desired by the user. When the probability operand determined by processor 42 is equal to the desired value a pattern has been recognized.)

k.) storing the summed Fourier series to an intermediate memory;

(intermediate memory section 62)

l.) removing the selected filters from the selected set of filters to form an updated set of filters;

(set of filters 52)

m.) removing the subsets from the string to obtain an updated string;

n.) selecting an updated filter from the updated set of filters;

(selecting updated filter 62 from set of filters 52)

o.) sampling the updated string with the updated filter to form a sampled Fourier series comprising a subset of the string;

p.) modulating the sampled Fourier series in Fourier space with the corresponding selected updated filter to form an updated order formatted Fourier series;

q.) recalling the summed Fourier series from the intermediate memory;

(intermediate memory section 62)

r.) adding the updated order formatted Fourier series to the summed Fourier series from the intermediate memory to form an updated summed Fourier series in Fourier space;

s.) obtaining an updated ordered Fourier series from the high level memory;

(high level memory section 54)

t.) determining a spectral similarity between the updated summed Fourier series and the updated ordered Fourier series;

u.) determining a probability expectation value based on the spectral similarity;

v.) generating a probability operand based on the probability expectation value;

w.) repeating steps n-v until the probability operand has a desired value or all of the updated filters have been selected from the updated set of filters, when the probability operand has a desired value a pattern in information has been recognized an order formatted pattern in the information has been established;

(processor 42)

x.) if all of the updated filters have been selected before the probability operand has a desired value, then clearing the intermediate memory and returning to step b;

y.) if the probability operand has a desired value, then storing the updated summed Fourier series to the intermediate memory;

z.) repeating steps l-y until one of the following set of conditions is satisfied: the updated set of filters is empty, or the remaining subsets of the string of step m.) is nil; and

(processor 42)

aa.) storing the Fourier series in the intermediate memory in the high level memory, said updated summed Fourier series representing said plurality of Fourier series in said strings ordered according to a plurality of associations between the information of the plurality of order formatted subset Fourier series and the at least one ordered Fourier series from high level memory.

(high level memory section 54)

An example of claim 299 is disclosed on page 1, line 32 to page 2, line 14, page 21, line 9 to page 23, line 26, referring to Fig. 5. Claim 299 provides a computer

readable medium having stored thereon a computer program to implement a method of recognizing a pattern in information comprising data and establishing an order formatted pattern in the information, said computer program comprising a plurality of codes for executing the steps of:

providing an input layer operable to receive data;

(input layer 12)

providing an association layer operable to add associated portions of said data together to form a string;

(association layer 14)

providing an ordering layer operable to order said string based on a relative degree of association of order formatted subsets of said string with relevant aspects of information of a standard string to form an ordered;

(string ordering layer 16)

providing a predominant configuration layer operable to receive a plurality of ordered strings to form a complex ordered string therefrom;

(predominant configuration layer 18)

assigning an activation probability parameter to each of said input layer, said association layer, said ordering layer and said predominant configuration layer, said activation probability parameter being determined based on a historical value of said activation probability parameter and an activation rate of respective ones of said input layer, said association layer, said ordering layer and said predominant configuration layer;

generating a probability operand based on the activation probability parameter; and

(activation probability parameter generator 66)

activating one or more of said input layer, said association layer, said ordering layer, said predominant configuration, said ordering layer, said predominant configuration layer, and said association layer if said probability operand has a desired

value, whereby a pattern in said information is recognized according to a historical associative pattern in said data.

(input layer 12, association layer 14, string ordering layer 16, predominant configuration layer 18, while the desired value is one in the disclosed example, any suitable value can be selected by the user)

An example of claim 304 is disclosed on page 1, line 29 to page 4, line 30, page 21, line 9 to page 23, line 26, referring to Fig. 5. Claim 304 provides a computer program product for use in a system for recognizing a pattern in information comprising data, said computer program product comprising:

a computer readable medium having stored thereon program code means, said program code means comprising:

means for receiving data, and to encode said received data as parameters of a plurality of Fourier series in Fourier space, said plurality of Fourier series including input context of said data;

(input layer 12)

means for associating Fourier series together to form a string;

(association layer 14)

means for ordering said string based on a relative degree of association of order formatted subsets of said string with relevant aspects of information of a standard string to form an ordered string; and

(string ordering layer 16)

means for forming a complex ordered string from a plurality of ordered strings, said complex ordered string representing a historical association and order of processed and stored information to thereby allow recognition of a pattern in information.

(predominant configuration layer 18)

An example of claim 307 is disclosed on page 6, line 25 to page 23, line 26. Claim 307 provides a data structure in a memory for access by a computer program for processing information, said data structure allowing an efficient recognition of a pattern in newly presented information comprising data and input context representing characteristic in relational association with information stored in said memory, said data structure comprising:

a plurality of transduced data objects, each of said plurality of transduced data objects providing an input data object representative of characteristics received from a transducer acting on a signal provided by the characteristics encoded as a Fourier series in Fourier space;

(input layer 12)

a plurality of memory data objects stored in memory registers corresponding to the input data objects;

(register 26 of memory 20)

a plurality of association data objects, each of said plurality of association data objects being a sum of associated ones of said plurality of memory data objects or transduced data objects;

(association layer 14)

a plurality of order formatted data objects, each of said plurality of order formatted data objects being one of said plurality of association data objects arranged in a hierarchically order of relative degree of association of relevant aspects of said information with respect to a standard plurality of association data objects;

(string ordering layer 16)

a plurality of activation probability objects, each of said plurality of activation probability objects being assigned to respective one of said plurality of transduced data objects, input data objects, memory data objects, said plurality of association data objects and said plurality of order formatted data objects;

(activation probability generator 66)

a plurality of probability operands being assigned to respective plurality of transduced data objects, input data objects, memory data objects, said plurality of association data objects and said plurality of order formatted data objects, each based on said activation probability objects;

(activation probability operand generator 70)

wherein each of said plurality of transduced data objects, said input data objects, said memory data objects, said plurality of association data objects and said plurality of order formatted data objects is activated when one of said plurality of probability operands has a desired value; and

(predominant configuration layer 18 discussed on page 22, lines 8-33)

wherein a value of each of said plurality of activation probability objects being determined based on historical values and frequency of activation of said respective one of said plurality of transduced data objects, input data objects, memory data objects, said plurality of association data objects and said plurality of order formatted data objects to thereby allow recognition of characteristics of said newly presented information based on historical relational and associational pattern in said information stored in said memory.

An example of claim 313 is described on page 2, lines 15-33, page 8, line 19 to page 16, line 15, page 22, line 34 to page 23, lines 26. Claim 313 provides a data structure in a memory for access by a computer program for efficient recognition of a pattern in information comprising data stored in the memory, the data structure comprising:

a plurality of transduced data objects, each of said plurality of transduced data objects providing an input data object representative of characteristics received from a respective one of a plurality of transducers acting on a signal provided by characteristics encoded as a Fourier series in Fourier space, wherein said input data objects allows associations among and relational pattern of said input data objects by spectral analysis to achieve recognition of a pattern in information, while preserving input context of said input signal including an identity of said respective one of said plurality of transducers.

(input layer 12, Fourier transform processor 22, spectral similarity analyzer 36)

7. Issues:

I. Whether claims 51-322 comply with 35 U.S.C. § 101.

II. Whether claims 51-322 comply with 35 U.S.C. § 112, first paragraph.

III. Whether claims 51-322 are anticipated under 35 U.S.C. § 102(b) over U.S. Patent No. 4,559,602 (hereinafter "Bates").

8. Grouping of Claims:

For purposes of the rejection of claims 51-322 under 35 U.S.C. § 101 in this Appeal only: claims 51-126 do not stand or fall with any other group of claims; claims 127-155, 157-159, 271-280 and 294-298 do not stand or fall with any other group of claims; claims 156 and 281-284 do not stand or fall with any other group of claims; claims 160-270, 290-293 and 299-306 do not stand or fall with any other group of claims; claims 285-289 do not stand or fall with any other group of claims; and claims 307-322 do not stand or fall with any other group of claims. Separate arguments have been provided for each group of claims identified above.

For purposes of the rejection of claims 51-322 under 35 U.S.C. § 112 in this Appeal only, all claims 51-322 stand or fall together.

For purposes of the rejection of claims 51-322 under 35 U.S.C. § 102 over Bates in this Appeal only, all claims 51-322 stand or fall together.

9. Arguments:

This appeal raises some rather unique issues in terms of the circumstances surrounding the prosecution of the present application. These circumstances - - which include two thorough examinations resulting in independent determinations of allowability of all claims, followed by a suspicious transfer of the case to a new

Examiner and rejection of the claims - - were highly unusual to say the least and bear directly on the merits of the case. Due to these unusual circumstances, as summarized below, Appellant has not only been denied the patent rights to which he is entitled, but has also been denied the right to fundamental fairness in the conduct of the examination process that is to be expected of the U.S. Patent Office.

The present Application was initially examined by three Examiners, Examiner Kanji Patel, Primary Examiner Christopher S. Kelly and Primary Examiner Matt Bella. As a result of this initial examination, Examiner Bella indicated to Appellant during a first interview that the claims would be allowed if the minor formal amendments shown in the Interview Summary were made since there were no prior art rejections of record. This initial indication of allowability was confirmed in a second examination by a Section 101 panel of three senior Examiners who found that the amended claims would indeed comply with Section 101 if the suggested amendments were made. Relying upon these representations, Appellant amended the claims in the Amendment dated January 27, 2000, which placed the Application in condition for allowance.

Subsequently, at the "eleventh hour," the present application was transferred without warning or explanation to new Examiner Bijan Tadayon. Examiner Tadayon, in complete disregard of the prior examinations indicating allowability, and who, by his own admission, lacks expertise in the field of artificial intelligence and did not take the time to adequately study the application, entered the rejection from which this Appeal is taken.

Appellant respectfully submits that the present application was improperly transferred and the claims rejected in an arbitrary and capricious manner. More specifically, the present application was transferred and rejected, not on the merits of the claimed invention, but rather, based solely on Appellant's status as the named inventor. Regrettably, as the following facts demonstrate, this prejudicial action conforms with a prior pattern of abuse and harassment targeted against Appellant.

The initial Examiners in this case, Examiner Patel and Primary Examiner Kelly, issued an Office Action on September 3, 1999 rejecting all of the claims solely under 35 U.S.C. § 101. No prior art rejections were made of record. To resolve the Section 101 rejection, the undersigned and the Appellant attended a first personal interview with

Primary Examiner Bella and Examiner Patel held on November 23, 1999. During the interview, Examiner Bella demonstrated his clear understanding of the invention, including its inherent utility and the adequacy of the disclosure. Indeed, Examiner Bella showed himself quite capable of intelligently discussing in detail the structure of the algorithm and flow chart underlying an embodiment of the invention and easily relating that structure to the claims, on a claim-by-claim basis. During the interview, Examiner Bella agreed that the claims represented patentable subject matter and would be allowed if minor formal amendments were made to include the purpose of pattern recognition. Examiner Bella further stated that he would personally attend the Section 101 panel of three supervisory patent Examiners that review claims containing algorithms for compliance with 35 U.S.C. § 101, as indicated in the Interview Summary of November 23, 1999.

The Section 101 panel reviewed the claims and confirmed their allowability. Subsequently, in a telephone conversation with the undersigned, Examiner Bella reaffirmed his original determination that the claims would be in allowable condition if minor formal amendments were made to the claims, including amending the preambles of claims 1, 27, and 33 to further clarify a useful purpose, as shown in the Interview Summary. These amendments were submitted in the Amendment dated January 27, 2000 under the assumption that all claims would be allowed.

Only three weeks later, certain unfortunate events unfolded outside the procedural history of the present application that drastically changed the status of this case and resulted in this Appeal. On February 17, 2000, Director Esther Kepplinger of Art Group 1700 improperly withdrew an unrelated application of Appellant, U.S. Serial No. 09/009,294, from issuance, that was due to issue as U.S. Patent No. 6,030,601 on February 29, 2000. Appellant has good reason to believe that she took that unprecedented action, without even the slightest review of the application, in response to competitive forces outside the Patent Office aligned against Appellant. See Director Kepplinger letter dated February 28, 2000 (Exhibit 2). Director Kepplinger also improperly withdrew from issuance four other allowed patent applications of Appellant that were due to issue as patents. The subject matter of these withdrawn patent applications bears no relation whatsoever to the underlying artificial intelligence

technology disclosed in the present application on appeal, but rather, relates to the field of quantum mechanics. Director Kepplinger's unfounded attack on Appellant in withdrawing his allowed patent applications from issue is presently the subject of ongoing litigation, now before the U.S. Court of Appeals for the Federal Circuit (Appeal No. 00-1530).

In view of this prior history, it can hardly be viewed as coincidence that the present application was transferred away from Examiner Bella, who indicated allowable subject matter, to Examiner Tadayon for rejection during the very same week of February 17, 2000 that Appellant's unrelated allowed applications were withdrawn from issuance. Clearly, the timing of these events demonstrates the transfer and rejection of this case was merely a continuation of the bias that was first invoked against Appellant in Director Kepplinger's attack on Appellant's other applications in Art Group 1700 and raises suspicions that motives beyond an open and honest prosecution on the merits of this case may have been a factor. Adding to this suspicion is the fact that Examiner Tadayon, in rejecting claims to Appellant's presently appealed application, has cited references relating to "quantum mechanics" and the "Schrodinger equation," subjects corresponding to Appellant's prior withdrawn applications, even though the presently claimed artificial intelligence invention does not relate to quantum mechanics.

Further suspicions were raised by Examiner Tadayon's statements to the undersigned during a second interview held on June 1, 2000 following the transfer of the case. During that interview, Examiner Tadayon alleged that he took control over the present application based on his supposed expertise in the field of artificial intelligence. It became increasingly clear, however, from discussions held during the interview that Examiner Tadayon lacked even a basic understanding of Appellant's novel usage of Fourier series in Fourier space.

Incredibly, Examiner Tadayon flatly refused to even discuss the present claims or the Section 101 and 102 rejections during the interview, and would only discuss a limited aspect of the Section 112 rejection, as reflected in the Interview Summary. Examiner Tadayon gave the following reasons for his steadfast refusals: (1) he was not the Examiner who made the Section 101 and 102 rejections; (2) he was not an expert

on Section 101 rejections; and (3) he would need to confer with other Examiners in response to any questions we had regarding the claims and the Section 101 rejection.

Appellant respectfully submits that by wresting control of the present application away from Examiner Bella (who with clear understanding of the claimed invention indicated its allowability, as did the Section 101 panel of three senior Examiners) and giving it Examiner Tadayon (who rejected the claims despite his lacking such understanding) lends credence to Appellant's belief that the Patent Office is more interested in punishing Appellant than conducting an open and honest prosecution on the merits of this case.

Since Examiner Tadayon was not the Patent Office official responsible for formulating the rejections in this case, as is quite apparent from his comments, Appellant requests that a full disclosure be made on the record of all Patent Office officials and outside consultants who provided input on the pending Office Action.

Apparently, this is not the first instance in which one of Appellant's applications has been secretly examined using a "figurehead" Examiner and information relating to that clandestine examination withheld from Appellant to his detriment. Appellant is now aware that a "secret committee" of Examiners and Directors have been convened to conduct a "behind-the-scenes" prosecution of other applications submitted by Appellant. See Director Kepplinger letter dated January 19, 2001 (Exhibit 3).

Other improprieties surrounding the examination of Appellant's applications have also been uncovered. For Example, Appellant has learned from Dr. Peter Zimmerman (chief science advisor at the U.S. Department of State and member of American Physical Society) that there is a "Deep Throat" contact in the Patent Office with whom Dr. Robert Park (spokesperson for the American Physical Society and a competitor of the Appellant) has had communications regarding Appellant's pending patent applications. The Patent Office was made aware of this outrageous situation over four months ago in connection with the above-mentioned litigation and, to this day, has not refuted it. See the Kepplinger letter dated January 19, 2001 (Exhibit 3).

Appellant has further learned through Mr. Ivan Solotaroff, a reporter for Philadelphia Magazine and for The New York Times Magazine, that Dr. Park has attacked the presently appealed application. Mr. Solotaroff conveyed to Appellant Dr. Park's statement to him that "Randy [Mills, Appellant] doesn't get it, the money is in the Quantum Computer based on entanglement and simultaneous computation in multiple parallel dimensions [greater than four]." Mr. Solotaroff also relayed how Dr. Park bragged about blocking the present artificial intelligence patent application from being allowed because it may interfere with the Quantum Computer project endorsed by the American Physical Society that is funded by the Department of Defense to the sum of over a hundred million dollars.

Appellant respectfully submits that the questionable timing of the transfer of the pending application to Examiner Tadayon, his refusal to discuss in an interview the pending claims and the Section 101 and 102 rejections of the claims, and his admission that other unnamed officials were responsible for actually preparing the Section 101 and 102 rejections are entirely consistent with the reporting of Dr. Park's boasts about blocking allowance of the pending application.

Moreover, the limited extent to which Examiner Tadayon was willing to discuss the Section 112 rejection during the interview and his strained arguments lend further credence to the notion that forces beyond those ordinarily encountered during the patent examination process were being brought to bear against Appellant. As detailed in the lengthy four-page Interview Summary, the Examiner was intent on finding non-existent holes in the logic of Appellant's invention using strained logic of his own that bordered on non-sensical.

Notably, Examiner Tadayon was extremely combative during the personal interview, particularly in his improper focus on mathematical formula described in the written description instead of on the claimed invention. Unfortunately, in doing so, he failed to grasp mathematical concepts that should have been readily apparent. For instance, contrary to the Examiner's comment on page 2 of the Interview Summary, the formula on page 11, line 29 is a proper Fourier series in Fourier space, as discussed more fully below in response to the Section 112 rejection. Furthermore, contrary to the Examiner's comment on page 3 of the Interview Summary, the filter described on page

14, lines 1, is a proper filter, as discussed below in response to the Section 112 rejection. When the topic of discussion turned to the claimed invention and Examiner Tadayon was questioned why the simple-to-follow and detailed flow charts provided in Figs. 1-21E did not comply with the requirements of Sections 101 and 112, inexplicably, he could not articulate any response.[1]

Yet another example of Examiner Tadayon's misunderstanding of the claimed subject matter was his assertion during the interview that Appellant had derived a new Fourier transform operation and his insistence that Appellant provide a mathematical proof thereof. The Examiner apparently fails to recognize that Fourier-type transforms are well known and that Appellant is simply using a novel method to parameterize data to form a novel type of Fourier series. Ironically, Appellant has already gone well beyond what the patent laws and rules require by providing detailed derivations of the mathematical formulae and examples in the Sub-Appendices to the application.

Ignoring the disclosed derivations, Examiner Tadayon requested additional proof of orthoganality for Fourier series based upon his mistaken belief that a data set input to Appellant's system must have the property of orthogonality in order that it could be parameterized into a Fourier series as taught by Appellant. This argument is simply non-sensical. Real world data is not necessarily orthogonal, nor does Appellant's invention require the data sets to be orthogonal. After even a cursory review of the application, it is clear that Appellant's disclosed invention does not teach Fourier transforming the input data as a waveform into a Fourier series with the requirement of orthogonal components. See Siebert, W. McC., <u>Circuits, Signals, and Systems</u>, The MIT Press, Cambridge, Massachusetts, (1986), pp. 364-384, cited on page 106 of the present application (Exhibit 4). In one embodiment, Applicant teaches FORMATTING the data as parameters ρ_{0_m} and $N_{m_{\rho_0}}$ of each component of a Fourier series in Fourier space. This format permits the determination of the spectral similarity of one set of data so formatted and another formatted in the same manner. In another embodiment, the data is simply formatted in terms of a specific memory structure that determines the

[1] Appellant's full response to the Section 112 rejection is provided in a separate section below.

parameterization of a formula for determination of the spectral similarity of one set of data and another. See page 13, line 1 to page 16, line 15 and page 45, lines 3-8 of the present application.

To his credit, Examiner Tadayon did offer an explanation during the interview for his lack of familiarity with the subject matter of the claimed invention, stating that he was so busy teaching new Examiners that he did not have time to learn the invention. This begs the question: Why did Examiner Tadayon take over prosecution in the first place if he was too busy to properly study the application and give it proper consideration?

Appellant has spent over two years prosecuting this application at considerable expense. It is simply outrageous that the Patent Office would subvert allowance of this case by ignoring the thorough examination conducted by three previous Examiners and the Section 101 panel of senior Examiners specializing in reviewing claims containing algorithms, and by transferring the case under suspicious circumstances to an Examiner who admittedly is not an expert in the field of artificial intelligence and was unable to articulate the basis for his rejections.

Such unfair treatment of Appellant's patent application constitutes an intolerable abuse of the examination process and undermines the merits of the pending rejections in this case.

I. <u>Claims 51-322 fully comply with 35 U.S.C. § 101.</u>

On page 3 of the Office Action dated March 14, 2000, the Examiner rejected all claims 51-322 under 35 U.S.C. § 101 for lacking patentable utility since the invention is not connected to the "physical world."

Appellant respectfully submits that all claims 51-322 fully comply with Section 101. Original claims 1-50 were rejected under Section 101. Appellants specifically amended the claims in the Amendment dated January 27, 2000 (new claims 51-322) as suggested by the previous Examiner Bella to address and overcome the Section 101 rejection. Appellant submits that the Section 101 panel of three senior Examiners,

which specializes in reviewing claims containing algorithms for compliance with Section 101, has already implicitly reviewed claims 51-322 and also found them to be in compliance with Section 101.

Claims 51-322 also comply with Section 101 for the following additional reasons.

Even though Appellant agrees with the Section 101 panel of senior Examiners that the present claims 51-322 fully comply with Section 101, to reduce the issues for appeal, Appellant has contemporaneously filed an Amendment of claims of 51 and 118 to include input and/or output steps as suggested by Examiner Tadayon. Thus, the part of Examiner Tadayon's Section 101 rejection regarding claims 51-126 is obviated.

The part of the Section 101 rejection regarding claims 127-156 and 160-322 is without merit for the following reasons and is thus appealed. 35 USC §101 limits the scope of statutory subject matter, i.e., those things that can be patented, to any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.

Two recent Federal Circuit cases address the proper focus of the Section 101 inquiry as it pertains to algorithm-related inventions. *State Street Bank & Trust Co. v. Signature Financial Group, Inc.,* 47 USPQ 2d 1596 (Fed. Cir. 1998) and *AT&T Corp. v. Excel Comm. Inc.*, 50 USPQ 2d 1447 (Fed. Cir. 1999). As stated in *AT&T* at 1454, the proper focus is "whether the algorithm-containing invention, as a whole, produces a tangible, useful result." *State Street*, provides a slightly different standard, namely, if a claimed mathematical algorithm produces "a useful, concrete and tangible result," then the claimed algorithm is deemed to have a practical use and thus presents patentable subject matter under Section 101. at 1602, See also MPEP§2106(II)(A) (The Patent Office explicitly follows the *State Street* standard).

The Federal Circuit has also made clear that the "useful, concrete and tangible result" that is required of algorithm-containing inventions is not necessarily a physical result. For example, in, *AT&T*, the tangible, efficiency in management of investment funds satisfied the useful and concrete result requirement. 50 USPQ2d at 1452 ("In *State Street*, we held that the processing system there was patentable subject matter because the system takes data representing discrete dollar amounts through a series of mathematical calculations to determine a final share price – a useful, concrete, and tangible result."); *See also In re Lowry,* 32 USPQ 2d 1031, 1035 (Fed. Cir. 1994) (holding that increased efficiency in computer operation is a useful, concrete and tangible result).

In accordance with this caselaw, all of the pending claims provide a tangible, useful result, namely, the recognition of a pattern in data and, thus, fully comply with Section 101. Previous Examiner Bella and the Section 101 panel explicitly recognized this standard when they required that the claims be amended to recite the purpose of recognizing the pattern in data.

Certain pending claims can also be shown to define patentable subject matter under Section 101 based on the "safe-harbor" provided in the Federal Circuit's *In re Lowry* decision. According to that case, all that is required to comply with Section 101 is that a claim set forth a "data structure" as do certain pending claims. 32 F. 3d 1579,1584 ("Data structures are physical entities that provide increased efficiency in computer operation."). Of course, as explained above, the increased efficiency of Appellant's inventive data structure further qualifies as the "useful, concrete and tangible result" that later courts have required. Thus, claims 307-322, which all require a "data structure in a memory for access by a computer program for processing information," fully comply with Section 101. Furthermore, claims 127-155, 157-159, 271-280 and 294-298 all require storing data in a memory, which is a connection to the "physical world" and thus, they too fully comply with Section 101.

The Federal Circuit's decision in *In re Beauregard* establishes another "safe harbor" providing additional support for the utility of Appellant's claimed invention. 53 F. 3d 1583, 35 USPQ 2d 1383 (Fed. Cir. 1995). In that case, the Commissioner of PTO agreed, and the Court concurred, that a computer program embodied in a tangible medium is statutory subject matter under Section 101. Thus, claims 160-270, 290-293 and 299-306, which all require "a computer-readable medium," fully comply with Section 101.

In addition, claims 156 and 281-284 recite a "system" comprising a memory and, thus, unambiguously constitute apparatus claims. The Examiner's comments regarding "connecting the invention to the physical world" therefore do not apply and these claims fully comply with Section 101.

Further, claims 285-289 fully comply with Section 101 since they recite independent physical activities performed by specific structures, and these claims specifically require the claimed objective of recognizing a pattern in data. These claims also recite providing an input layer, which directly connects them to the physical world and, thus, addresses Examiner Tadayon's concerns.

For all of the foregoing reasons, Appellant submits that all of the pending claims 51-322 fully comply with Section 101.

II. <u>Claims 51-322 fully comply with 35 U.S.C. § 112, first paragraph.</u>

In the Office Action dated March 14, 2000, the Examiner rejected all claims 51-322 under 35 U.S.C. § 112, first paragraph. Appellant respectfully submits that all claims 51-322 fully comply with Section 112, first paragraph, for the following reasons.

The invention is clearly disclosed in the present application such that one skilled in the art could make and use the same. For example, one skilled in the art would easily be able follow the detailed flow charts in Figs. 1-5 and 18-21E and configure a computer to carryout the claimed utility of pattern recognition. Appellant notes that Examiner Tadayon ignores these flow charts in the present Office Action and has refused to respond to any questions posed during the interview regarding their relevance to the claimed invention.

Examiner Tadayon also ignores the disclosure in his broad conclusory statements on page 4 of the Office Action:

> "Applicant has used a lot of well-known methods, concepts, physical formulations, and mathematical analysis. . . . the applicant has failed to teach the connection between these concepts in the current application, and has not explained to an ordinary skill in the art as to how one can implement the disclosure, without further experimentation and/or substantial research, which puts a lot of burden on the ordinary skill in the art. The incomplete or vague specification does not satisfy the requirements for proper patent disclosure."

These statements are wholly without merit. First, the proper standard is "one skilled in the art" not "an ordinary skill in the art." Second, Appellant has gone far beyond the requirements of Section 112, first paragraph, in terms of providing adequate disclosure. Unfortunately, Examiner Tadayon has chosen to ignore that disclosure for reasons Appellant fails to comprehend. As noted above, Examiner Tadayon has ignored the easy-to-follow flow charts in making his rejection and has refused to even discuss their relevance. In addition to these flow charts, Appellant provided a detailed written description of example embodiments, as well as a Support Appendix and Sub-Appendices in the application as reference materials for background mathematics and theory.

Still further, Appellant's specification provides examples of various processes carried out by the invention. One example includes the recognition of a geometric shape, such as a triangle, disclosed starting on page 7, line 35 of the present application: "The following example illustrates how the present invention processes the physical characteristics of an item of interest, specifically a triangle."

On page 5 of the Office Action, Examiner Tadayon posits further conclusory statements demonstrating a lack understanding of the claimed invention, rather than any defect in the disclosure: "the relationships between the following concepts are not clear in the specification of the current application . . . [a long list of terms is cited]." Appellant submits that following a simple and complete reading of the application, including the flow charts of Figs. 1-5 and 18-21E, one skilled in the art would easily understand the relationships between the terms cited by the Examiner.

Given the fact that Examiner Tadayon was admittedly too busy training Examiners to learn the invention and, thus, apparently did not have sufficient time to read and study the application, Appellant provides the following detailed citations to the written description of the application for each of the terms cited by the Examiner on page 5 of the Office Action in the hope that this exercise will eliminate some of the issues on appeal:

<u>pattern recognition</u>- one of the functions of the invention is to recognize a pattern in input data according to a pattern with which the system is initialized. See Summary of the Invention and page 12, lines 25-34 of the application.

<u>Fourier space</u>- the information is represented as a Fourier series in **Fourier space** in that the data comprises the parameters of each component of the series. At page 2, lines 15-20, the application teaches, "One aspect of the present invention is directed to inputting information as data to the system within an input context and associating the data. This aspect of the invention includes encoding the data as parameters of at least two Fourier components in Fourier space, adding the Fourier components to form at least two Fourier series in Fourier space, the Fourier series representing the information"

As shown in the equation on page 8, line 26 of the application, in this example <u>frequency</u> is a variable in the present novel Fourier series in Fourier space. See page 8, lines 25-29 of the application for an example of a Fourier series in Fourier space defined according to the present invention, which must be distinguished from conventional Fourier series. Fourier space is also referred to as $k,\omega-$space. See page 24, line 34 to page 25, line 22 of the application.

different layers (Input, Association, String Ordering, Predominant Configuration Layer)- layer is a term of art in computer science which refers to a specific operation of a program. At page 24, lines 10-17, the application teaches, "The methods and systems of the present invention are herein defined as the "processor" which is capable of storing, retrieving, and processing data to form novel conceptual content according to the present invention. The "processor" comprises systems and associated processes which serve specific functions which are collectively called "layers". The "layers" are organized so as to receive the appropriate inputs and produce the appropriate outputs according to the present invention. A function of the Input, Association, String Ordering, Predominant Configuration Layers is given at page 1, line 29 to page 2, line 14, page 7, line 11-34, and Figure 1 of the application.

Gaussian filter- An example of a Gaussian filter is disclosed at page 13, line 27 to page 14, line 3, of the application, which teaches, "The filter 34 can be a time delayed Gaussian filter in the time domain. The filter may be characterized in time by:

$$\frac{\alpha}{\sqrt{2\pi}} e^{-\frac{\left(t-\frac{\sqrt{N}}{\alpha}\right)^2}{\frac{2}{\alpha^2}}}$$

wherein $\frac{\sqrt{N}}{\alpha}$ is a delay parameter, α is a half-width parameter, and t is the time parameter. The Gaussian filter may comprise a plurality of cascaded stages each stage having a decaying exponential system function between stages. The filter, in frequency space, can be characterized by:

$$e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

wherein $\frac{\sqrt{N}}{\alpha}$ and α are a corresponding delay parameter and a half-width parameter in time, respectively, and f is the frequency parameter." The derivation is given in SUB-APPENDIX II found on page 60, line 1, to page 64, line 36 of the application. A delayed Gaussian filter in time and its Fourier transform are known as shown by Siebert, W. McC., Circuits, Signals, and Systems, The MIT Press, Cambridge, Massachusetts, (1986), pp. 488-502. A copy is provided in Exhibit 4.

probability expectation value- Hogg and Tanis (R. V. Hogg, E. A. Tanis, Probability and Statistical Inference, MacMillan Publishing Co., Inc., New York, (1977), pp. 51-55) give a definition of the expectation value:

Definition 2.2-1. *If* $f(x)$ *is the p.d.f. of the random variable* X *of the discrete type with space* R *and if the summation*

$$\sum_{R} u(x)f(x) = \sum_{x \in R} u(x)f(x)$$

exists, then the sum is called the mathematical expectation *or the* expected value *of the function* $u(X)$ *and it is denoted by* $E[u(x)]$. That is,

$$E[u(x)] = \sum_{R} u(x)f(x)$$

We can think of the expected value or the expectation value $E[u(x)]$ as a weighted mean of $u(X)$, $x \in R$, where the weights are the probabilities $f(x) = P(X = x), x \in R$.

In the present invention, the probability expectation value may be any desired value as selected by the user, but is usually a number between zero and one, which represents the statistical outcome or weighted mean as the number of trials of the probability operand that returns a zero or one goes to infinity.

In an embodiment of the present invention, the probability expectation value is disclosed on page 2 lines 15-32, "One aspect of the present invention is directed to inputting information as data to the system within an input context and associating the data. This aspect of the invention includes encoding the data as parameters of at least two Fourier components in Fourier space, adding the Fourier components to form at least two Fourier series in Fourier space, the Fourier series representing the information, sampling at least one of the Fourier series in Fourier space with a filter to form a sampled Fourier series, and modulating the sampled Fourier series in Fourier space with the filter to form a modulated Fourier series. This aspect of the invention also includes determining a spectral similarity between the modulated Fourier series and another Fourier series, determining a probability expectation value based on the spectral similarity, and generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value. These steps are repeated until the probability operand has a value of one. Once the probability operand has a value of one, the modulated Fourier series and the other Fourier series are added to form a string of Fourier series in Fourier space, and the string of Fourier series is stored in the memory."

similarity between at least 2 filtered and unfiltered Fourier series- While the present Fourier series are novel, conventional Fourier series are well known in the art of signal processing. Filtering a wave form is also well known, as shown by the convolutions of the time functions or the product of their corresponding Fourier transforms provided in Siebert, W. McC., Circuits, Signals, and Systems, The MIT Press, Cambridge, Massachusetts, (1986), pp. 471-502, cited on page 106, lines 3-4 of the present application (Exhibit 4). In an embodiment of the invention, a filtered Fourier series according to the present invention is given by the multiplication of a Fourier series in Fourier space by the Fourier transform of a time delayed Gaussian filter as described on page 15, line 19 to page 16, line 12 and page 18, line 22 to page 19, line 12 of the application. As disclosed on page 2, lines 15-32, "One aspect of the present invention is directed to inputting information as data to the system within an input context and associating the data. This aspect of the invention includes encoding the data as parameters of at least two Fourier components in Fourier space, adding the Fourier components to form at least two Fourier series in Fourier space, the Fourier series representing the information, sampling at least one of the Fourier series in Fourier space with a filter to form a sampled Fourier series, and modulating the sampled Fourier series in Fourier space with the filter to form a modulated Fourier series. This aspect of the invention also includes determining a spectral similarity between the modulated Fourier series and another Fourier series, determining a probability expectation value based on the spectral similarity, and generating a probability operand having a value selected from a set of zero and one, based on the probability expectation value. These steps are repeated until the probability operand has a value of one. Once the probability operand has a value of one, the modulated Fourier series and the other Fourier series are added to form a string of Fourier series in Fourier space, and the string of Fourier series is stored in the memory."

delay parameters- refer to each time delay parameter of a delayed Gaussian filter of the present invention. (See Gaussian filter above.)

modulation factors- in the Fourier or frequency domain, a time delayed Gaussian filter samples and modulates a function which is filtered in the time domain. At page 13, line 27 to page 14, line 3, the application teaches, "The filter 34 can be a time delayed Gaussian filter in the time domain. The filter may be characterized in time by:

$$\frac{\alpha}{\sqrt{2\pi}} e^{-\frac{\left(t-\frac{\sqrt{N}}{\alpha}\right)^2}{\frac{2}{\alpha^2}}}$$

wherein $\frac{\sqrt{N}}{\alpha}$ is a delay parameter, α is a half-width parameter, and t is the time parameter. The Gaussian filter may comprise a plurality of cascaded stages each stage having a decaying exponential system function between stages. The filter, in frequency space, can be characterized by:

$$e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

wherein $\frac{\sqrt{N}}{\alpha}$ and α are a corresponding delay parameter and a half-width parameter in time, respectively, and f is the frequency parameter." The term, $e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$ modulates the Fourier series in Fourier space, thus, it is the modulation factor. And the term $e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2}$ samples the Fourier series in Fourier space. At page 2, lines 20-23, the application teaches, " sampling at least one of the Fourier series in Fourier space with a filter to form a sampled Fourier series, and modulating the sampled Fourier series in Fourier space with the filter to form a modulated Fourier series." At page 13, lines 7-9, the application teaches "At least one of the Fourier series stored in the Fourier series section 32 is input to a filter 34 wherein the filter 34 samples and modulates the Fourier series." And, at page 13, line 27 to page 14, line 3, the application teaches, "The filter 34 can be a time delayed Gaussian filter in the time domain. The filter may be characterized in time by:

$$\frac{\alpha}{\sqrt{2\pi}} e^{-\frac{\left(t-\frac{\sqrt{N}}{\alpha}\right)^2}{\frac{2}{\alpha^2}}}$$

wherein $\frac{\sqrt{N}}{\alpha}$ is a delay parameter, α is a half-width parameter, and t is the time parameter. The Gaussian filter may comprise a plurality of cascaded stages each stage having a decaying exponential system function between stages. The filter, in frequency space, can be characterized by:

$$e^{-\frac{1}{2}\left(\frac{2\pi f}{\alpha}\right)^2} e^{-j\sqrt{N}\left(\frac{2\pi f}{\alpha}\right)}$$

wherein $\frac{\sqrt{N}}{\alpha}$ and α are a corresponding delay parameter and a half-width parameter in time, respectively, and f is the frequency parameter." Also see SUB-APPENDIX II.

At page 32, lines 13-15, the application teaches, "Each Fourier series such as a "SFCs" representing information is filtered and delayed in the time domain (modulated and sampled in the frequency domain or k,ω - space) as it is recalled from memory".

Modulation factors also provide a basis for encoding context in the present invention. At page 7, lines 14-16 the application teaches, "The Input Layer 12 also encodes the input context as delays in time corresponding to a modulation factor of the Fourier series at corresponding frequencies." At page 10, line 34 to page 11, line 3, the application teaches, "The time intervals represent time delays which correspond to the characteristic modulation frequency band in Fourier space which in turn represents the input context according to the specific transducer or transducer subcomponent." See also page 10, line 34 to page 12, line 2 of the application.

<u>association ensemble</u>- is a given as background information of a analog embodiment. At page 28, lines 9-28, the application discloses, "The Association Layer and the "String" Ordering Layer comprise cascaded processor stages which are herein defined as "stages". The "stages" need not be identical. Let $h_i(t)$ be the impulse response of the i^{th} stage and assume that $h_i(t) \geq 0$, so that the step response of each stage (or indeed of any number of cascaded stages) is monotonic. Cascaded stages form filters. The Central Limit Theorem of probability theory states in effect that, under very general conditions, the cascade of a large number of linear-time-invariant (LTI) systems will tend to have a delayed Gaussian impulse response, almost independent of the characteristics of the systems cascaded. Sufficient conditions of the Central Limit Theorem are given by Eqs. (37.52-37.55) of SUB-APPENDIX II--Modulation and Sampling Gives the Input to the Association Mechanism and Basis of Reasoning. The collective of multiple cascaded "stages" comprises an "association ensemble" that receives input such as a " SFCs". Each "association ensemble" serves as a heterodyne having an exemplary representation given by Eq. (37.50) by modulating the Fourier series in k,ω - space. It further samples the Fourier series in k,ω - space. The modulation and sampling functions correspond to a delayed Gaussian filter in the time domain having an exemplary representation given by Eq. (37.51)."

<u>nested sets of sequential subsets of random DNA fragments</u>- DNA is a linear sequence of ordered nucleotides. The application teaches a generalized technique that provides the

determination of the linear order from random DNA fragments and presents this method in SUB APPENDIX IV and V as an exemplary method to establish an order of information represented by Fourier series in Fourier series or an equivalent representation in the form of a structured memory. At page 48, line 13 to page 49, line 2, the application teaches, "Consider the time interval $t=t_i$ to $t=t_f$ of a "string" associated by "association ensembles" and recorded to memory. By processing the "string' with multiple "association ensembles" comprising Gaussian filters each of different delay, $\frac{\sqrt{N_s}}{\alpha_s}$, and half-width parameter, α_s, the "string" can be "broken" into "groups of SFCs" each having a center of mass at a time point corresponding to the delay $\frac{\sqrt{N_s}}{\alpha_s}$ and frequency composition corresponding to α_s which form a nested set of "sequential subsets" of "groups of SFCs" of the "string" in k,ω-space which map to time points which are randomly positioned along the time interval from the $t=t_1$-side and the $t=t_2$-side as shown in FIGURES 8, 10, 12, and 14. This nested set of "sequential subsets" of random "groups of SFCs" mapping to random time points from the $t=t_i$-side and the $t=t_f$-side is analogous to the nested set of "sequential subsets" of random DNA fragments from the 5' end and the 3' end. The order in both cases can be solved by the Genomic DNA Sequencing Method/Matrix Method of Analysis [3, 4] described in SUB-APPENDIX V."

At page 34, lines 3-23, the application discloses, "The collective sampling of the specific "association ensembles" provides a nested set of subsets of information where each subset maps to a specific time point corresponding to the specific delay, $\frac{\sqrt{N_s}}{\alpha_s}$, of the specific Gaussian filter of the "association ensemble" (Eqs. (37.50-37.51)). The nested set of subsets of information is ordered by the Matrix Method of Analysis Algorithm of Appellant with Poissonian probability based associations with input from High Level Memory. Each "group of SFCs" of the input "string" has the corresponding time delay parameter, $\frac{\sqrt{N_s}}{\alpha_s}$, and the half-width parameter, α_s, of the Gaussian filter of the "association ensemble" (Eqs. (37.50-37.51)) that resulted in the "coupling" and "association" to form the "string". The process of ordering assigns a particular time delay, $\frac{\sqrt{N_{s'}}}{\alpha_{s'}}$, and half-width parameter, $\alpha_{s'}$, to each "group of SFCs" of the output "string". The half-width parameter, $\alpha_{s'}$ corresponds to

each specific delayed Gaussian filter that samples the input "string" in the frequency domain to provide each "group of SFCs" of the output "ordered string". Each corresponding particular time delay, $\frac{\sqrt{N_{s'}}}{\alpha_{s'}}$, encodes and corresponds to the time domain order of each "group of SFCs" of the output "ordered string". An order processed "string" called a "P string" may comprise complex information having conceptual content."

At page 47, lines 9-19, the application discloses, "In a preferred embodiment, the string is sampled with specific "association ensembles" which provide a "nested set of subsets" of information comprised of a "SFCs" and "groups of SFCs" where each "subset" sampled from the input "string" maps to a specific time point corresponding to the specific delay, $\frac{\sqrt{N_s}}{\alpha_s}$, of the specific Gaussian filter of the "association ensemble" (Eqs. (37.50-37.51)). The process of ordering assigns a particular time delay, $\frac{\sqrt{N_{s'}}}{\alpha_{s'}}$, and half-width parameter, $\alpha_{s'}$, to each "subset" of the output "string" using the "nested set of subsets" as input to the Matrix Method which is herein presented as a mechanism used by the "processor" to sequence information temporally, conceptually, or according to causality."

<u>groups of SFCs</u>- A definition and use of SFCs is in the Support Appendix and Sub Appendices to provide background for the examiner. FCs is Fourier components, SFCs is a series of Fourier components, groups of SFCs is a sum of a series of Fourier components and a string is yet a further sum of Fourier series. FIGURE 19 is a flow diagram of an exemplary hierarchical relationship of the signals in Fourier space comprising "FCs", "SFCs", "groups of SFCs", and a "string" accordance with the present invention. An exemplary layer structure is shown in FIGURE 20.

At page 40, line 29 to page 41, line 12, the application discloses, "A "FC" of Eq. (37.32) is a series of a Fourier component. A distinct superposition or series of "FCs" is called a "SFCs" which further superimpose to form "groups of SFCs". The data is digitized according to the parameter N of Eqs. (37.33), (37.33a), and (37.87)."

memory ensemble- background is given in the Support Appendix and Sub Appendices that provides an analog embodiment. At page 35, lines 26-27, applicant teaches, "and a strongly linked group of memory elements comprises a "memory ensemble".

P element- is a processing element as described according to its impulse response as given in SUB APPENDIX I that describes an analog embodiment. At page 26, line 12 to page 27, line 16, the application teaches, "All layers comprise processor elements called "P elements" each with a system function response defined as the "impulse response" (Eqs. (37.22-37.24)) and an output (herein defined as the "P element response") shown in FIGURE 6 comprising a "pulse train of impulse responses"--an integer number of traveling dipole waveforms (each called an "impulse response"). The Fourier transform of this signal is the convolution of a sinc function with a periodic series of delta functions where the amplitude and the width of the sinc function is determined by the integer number of "impulse responses" of the signal. In a preferred embodiment, the amplitude of the "impulse response", the temporal and spatial spacing or repetition frequency of the "impulse responses", and the integer number of "impulse responses" of the "P element" signal is proportional to rate of voltage change called "depolarization" of the "P element". This rate is determined by the amplitude and rate of change of the input. Thus, in the preferred embodiment, each "P element" is a linear differentiator--the output (pulse train of "impulse responses") is the sum (superposition) of the derivative of the inputs. Additionally in the embodiment, the "P element" has a threshold of "depolarization" to generate an output. In this case, the Fourier transform of "P element response" comprises a repeated series of a Fourier component herein defined as a "FC" with quantized frequency and phase angle. In another embodiment, the amplitude is also quantized. In $k,\omega-$space, the Fourier transform of the "impulse response" function filters the "FC" of a "P element" and is a band-pass when the spatial frequency of the "FC" is equal to the temporal frequency (i.e. the "FC" is band-passed when $k_\rho = k_z$).

An exemplary output signal of an analog "P element" to an input of the form given by Eq. (37.26) is given in time by Eq. (37.27) (the parameters ρ_0, z_0, and N may encode quantitative information such as intensity and rate of change of a physical parameter such as temperature) and in $k,\omega-$space by Eq. (37.32). The latter equation is that of a series of a Fourier component with information encoded in the parameters ρ_0 and N of the Fourier

component. "P elements" are directionally massively interconnected in terms of the inputs and the outputs of the present invention which may superimpose. Multiple "P elements" input into any given "P element" which then outputs to multiple "P elements. The Fourier transform of the superposition of the output of multiple "P elements" is a repeating Fourier series--a repeating series of trigonometric functions comprising a series of Fourier components "FCs" herein referred to as a " SFCs". Exemplary representations are given by Eq. (37.33) and Eq. (37.33a). Thus, the present "processor" may function as an analog Fourier processor."

association mechanism- SUB-APPENDIX II is the derivation of the Modulation and Sampling Gives the Input to the Association Mechanism and Basis of Reasoning according to the present invention, and SUB-APPENDIX III is the derivation of the Association Mechanism and Basis of Reasoning according to the present invention. The theory is presented to provide understanding for the system disclosed at pages 1-24. At page 72, lines 6-22, the application teaches, "In one embodiment, the present "processor" is an analog Fourier processor wherein the data is digitized according to the parameter N of Eqs. (37.33), (37.33a), and (37.87). Each "FC" of Eqs. (37.33) is a series of a Fourier component with quantized frequency and phase angle. Each "FC" of Eqs. (37.33a) is a series of a Fourier component with quantized amplitude, frequency, and phase angle. Each "SFCs" represented by Eq. (37.33) and Eq. (37.33a) is filtered and delayed in the time domain (modulated and sampled in the frequency domain) as it is recalled from memory and processed by an "association ensemble". "Association ensembles" produce interference or "coupling" of the "SFCs" of one set of "M or P elements" with that of another by producing frequency matched and phase locked Fourier series --sums of trigonometric waves that are frequency matched and periodically in phase--that give rise to "association" of the corresponding recalled or processed information. The Poissonian probability of such "coupling" (Eq. (37.106)) can be derived from the correlation function (Eq. (37.78) wherein Eq. (37.87) is a parameter."

At page 79, line 21 to page 80, line 3, the application teaches, "Eq. (37.106) gives the probability $P_A\left(\frac{\sqrt{N_1}}{\alpha_1}, \frac{\sqrt{N_2}}{\alpha_2}, \ldots, \frac{\sqrt{N_s}}{\alpha_s}, \delta_s\right)$ of the occurrence of "association" of the corresponding Fourier series based on a first "active" "association ensemble" with modulation $e^{-j\sqrt{N_1}\left(\frac{2\pi f}{\alpha_1}\right)}$

given by Eq. (37.50) "coupling" with s separate "association ensembles" each with modulation $e^{-j\sqrt{N_s}\left(\frac{2\pi f}{\alpha_s}\right)}$ given by Eq. (37.50) and independent phase shift, δ_s. The process of first establishing "associations" between different Fourier series representative of different pieces of information is the basis of producing information with novel conceptual content. The formation of "associations" is also the basis of reasoning. The generation of "associations" depends on the statistics of "coupling" of multiple "association ensembles" each comprised of cascaded association "stages". Then the "associated" information is ordered or further processed to provide general context such as cause and effect relationships by a mechanism involving the half-width parameters, α_s, the time delay parameters, $\frac{\sqrt{N_s}}{\alpha_s}$, and potentially the independent phase shifts, δ_s, of Eq. (37.106). The ordering of "associated" information is described in SUB-APPENDIX IV--Ordering of Associations: Matrix Method.

At page 13, lines 10-26, the application teaches the use of probability to make an association and form a string of Fourier series representing the associated information, "A spectral similarity value is output from the spectral similarity analyzer 36 and input to a probability expectation analyzer 38. The probability expectation analyzer 38 determines a probability expectation value based on the spectral similarity value. The probability expectation value output from the probability expectation analyzer 38 is input to a probability operand generator 40. The probability operand generator 40 generates a probability operand value of one or zero based upon the probability expectation value. The probability operand value is output to a processor 42. If the probability operand value is zero, the processor 42 sends another Fourier series from the Fourier series section 32 of the temporary memory section 28 to the filter 34 and begins the process again. If the probability operand value is one, the filtered Fourier series and the other Fourier series are added to form a string and the string is stored in a string memory section 44."

<u>basis of reasoning</u>- The theory is presented to provide understanding for the digital system disclosed at pages 1-24. SUB-APPENDIX III is the derivation of the Association Mechanism and Basis of Reasoning according to the present invention which gives the theoretical basis and background of the operability of an analog system of the present invention to achieve

pattern recognition and create information of novel content. (See association mechanism above.)

the coupling- refers to an analog system disclosed in SUB-APPENDIX III. The term "the coupling" is used by Appellant as a means of illustrating the theory of determination of spectral similarity by an analog system wherein energy may be transferred from one excited system to another if the corresponding spectra of the transferring and receiving then excited system are sufficiently similar. The coupling establishes an association and is described in the association mechanism given above.

energy difference between the final and initial nuclear states- is considered in the derivation of exemplary background theory of the physical behavior of a large number of "active" cascaded association "stages" (an "association ensemble") each weakly linked to provide a Poissonian probability of "coupling" to one or more "stages" of one or more different "association ensembles". The derivation is given in SUB-APPENDIX III as a means of illustrating the theory of determination of spectral similarity by an analog system wherein energy may be transferred from one excited system to another if the corresponding spectra of the transferring and receiving then excited system are sufficiently similar. The transfer establishes an association. At page 65, line 31 to page 67, line 21, the application teaches, "The physical behavior of a large number of "active" cascaded association "stages" (an "association ensemble") each weakly linked to provide a Poissonian probability of "coupling" to one or more "stages" of one or more different "association ensembles" is equivalent to that of the interaction of ultrasound with Mossbauer gamma rays. Each "association ensemble" "carries" a Fourier series in k,ω - space such as a "M or P element response" which comprises a sum of harmonic functions. Thus, physically, the former case corresponds to interference of a first Fourier series input filtered by an "association ensemble" with a second, third, or s th Fourier series input filtered by s the "association ensemble". The latter case corresponds to interference of an electronic transition and an oscillator transition. In both cases, a harmonic energized state interferes with another.

Consider the Lamb-Mossbauer formula for the absorption of a γ ray of energy E by a nucleus in a crystal given by Maradudin [11].

$$\sigma_a(E)=\frac{1}{4}\sigma_0\Gamma^2\sum_{mn}e^{-\frac{\beta E_m}{Z}}X\frac{\rangle m|e^{i\left(\frac{\mathbf{p}}{\hbar}\right)\cdot\mathbf{R}(l)}|n\langle\rangle n|e^{-i\left(\frac{\mathbf{p}}{\hbar}\right)\cdot\mathbf{R}(l)}|m\langle}{(E_0-E+E_n-E_m)^2+\frac{1}{4}\Gamma^2} \tag{37.56}$$

In this equation, E_0 is the energy difference between the final and initial nuclear states of the absorbing nucleus, E_m and E_n are the energies of the eigenstates $|m\langle$ and $|n\langle$ of the crystal, respectively, Γ is the natural width of the excited state of the nucleus, $\mathbf{p}$ is the momentum of the γ ray, $\mathbf{R}(l)$ is the instantaneous position vector of the absorbing nucleus, Z is the crystal's partition function, $T=(k\beta)^{-1}$, and σ_0 is the resonance absorption cross section for the absorbing nucleus. By expressing the denominator of Eq. (37.56) as an integral, Eq. (37.56) is equivalent to

$$\sigma_a(E)=\frac{1}{2}\sigma_0\gamma\int_{-\infty}^{\infty}dte^{i\omega t-\gamma|t|}X\rangle exp[-i\mathbf{k}\cdot\mathbf{u}(l;t)]exp[i\mathbf{k}\cdot\mathbf{u}(l;0)]\langle \tag{37.57}$$

wherein the position vector $\mathbf{R}(l)$ is

$$\mathbf{R}(l)=\mathbf{x}(l)+\mathbf{u}(l) \tag{37.58}$$

For, Eq. (37.58), $\mathbf{x}(l)$ is the position vector of the mean position of the absorbing nucleus, and $\mathbf{u}(l)$ is its displacement from the mean position. Eq. (37.57) follows from Eq. (37.56) with the following substitutions:

$$\left(\frac{1}{\hbar}\right)\mathbf{p}=\mathbf{k} \tag{37.59}$$

$$\hbar\omega=E-E_0 \tag{37.60}$$

$$\gamma=\frac{\Gamma}{2\hbar} \tag{37.61}$$

and $\mathbf{u}(l;t)$ denotes the Heisenberg operator,

$$\mathbf{u}(l;t)=e^{i\left(\frac{t}{\hbar}\right)H}\mathbf{u}(l;0)e^{-i\left(\frac{t}{\hbar}\right)H} \tag{37.62}$$

where H is the Hamiltonian. The angular brackets in Eq. (37.57) denote an average over the canonical ensemble of the crystal.

The correlation function for the statistical average of a large number of "active" cascaded association "stages" (an "association ensemble") each weakly coupled to one or more "stages" of one or more different "active" "association ensembles" is equivalent to that of the interaction of ultrasound with Mossbauer gamma rays. From Eq. (37.57), the correlation function $Q(t)$ of acoustically modulated gamma ray absorption by Mossbauer nuclei is

$$Q(t)=\rangle exp[-i\mathbf{k}\cdot\mathbf{u}(l;t)]exp[i\mathbf{k}\cdot\mathbf{u}(l;0)]\langle \tag{37.63}$$

In the present case, $\mathbf{u}(l)$ corresponds to the delay of an "association ensemble" s comprising a time delayed Gaussian filter. In k,ω - space, the time delay corresponds to a modulation of the s th Fourier series (e.g. "P or M element response" given by Eq. (37.33)) that is "carried" by the "association ensemble" s). Since the Fourier series is a sum of trigonometric functions in k,ω - space, the modulation corresponds to a frequency shift of the Fourier series "carried" by the "association ensemble" s. $\mathbf{k}$ of Eq. (37.59) corresponds to the wavenumber of the frequency shifted s th Fourier series. $\frac{E-E_0}{\hbar}$ of Eq. (37.60) is the shifted frequency of a first Fourier series that is "carried" by a first "association ensemble"."

<u>interaction of ultrasound with Mossbauer gamma rays</u>- is part of the derivation described above for the <u>energy difference between the final and initial nuclear states</u> regarding exemplary background theory of the physical behavior of a large number of "active" cascaded association "stages" (an "association ensemble") each weakly linked to provide a Poissonian probability of "coupling" to one or more "stages" of one or more different "association ensembles". The derivation is given in SUB-APPENDIX III as a means of illustrating the theory of determination of spectral similarity by an analog system wherein energy may be transferred from one excited system to another if the corresponding spectra of the transferring and receiving then excited system are sufficiently similar. The transfer establishes an association. At page 67, lines 22-24, the application reaches "In the case of acoustically modulated gamma ray absorption by Mossbauer nuclei, $\mathbf{u}(l;t)$ of Eq. (37.62) is

$$\mathbf{u}(l;t) = e^{i\left(\frac{t}{\hbar}\right)E}\mathbf{u}(l;0)e^{-i\left(\frac{t}{\hbar}\right)E} \tag{37.64}$$

The derivation continues to page 78, lines 20-26: "Eq.(37.106b) gives one as the maximum probability of the occurrence of "association". In other embodiments, the probability maximum may be less than one. In this case, Eq. (37.106b) is

$$P_A\left(\frac{\sqrt{N_1}}{\alpha_1},\frac{\sqrt{N_2}}{\alpha_2},\ldots,\frac{\sqrt{N_s}}{\alpha_s},P,p_{\uparrow_s},\delta_s\right) = \prod_s\left[p_{\uparrow_s} + \left(P - p_{\uparrow_s}\right)exp\left[-\beta_s^{-2}\left(\frac{1-cos\,2\phi_s}{2}\right)\right]cos\left(\delta_s + 2\,sin\,\phi_s\right)\right] \tag{37.106c}$$

where P is the maximum probability of the occurrence of "association". Eq. (37.105) and Eq. (37.106) represent the "association" probability parameter."

<u>central limit theorem</u>- At page 28, lines 14-19, the application teaches, "The Central Limit Theorem of probability theory states in effect that, under very general conditions, the

cascade of a large number of linear-time-invariant (LTI) systems will tend to have a delayed Gaussian impulse response, almost independent of the characteristics of the systems cascaded. Sufficient conditions of the Central Limit Theorem are given by Eqs. (37.52-37.55) of SUB-APPENDIX II". In SUB-APPENDIX II, the application discloses the theory and background of the delayed Gaussian filter which is used in the present invention as described under Gaussian filter and modulation factors given above. An application of the Central Limit theorem in signal processing is given in Siebert, W. McC., Circuits, Signals, and Systems, The MIT Press, Cambridge, Massachusetts, (1986), pp. 488-502, copy provided in Exhibit 4.

active association ensemble- Is a derivation regarding the theory of the physical behavior of a large number of "active" cascaded association "stages" (an "association ensemble") each weakly linked to provide a Poissonian probability of "coupling" to one or more "stages" of one or more different "association ensembles". The derivation is given in SUB-APPENDIX III as a means of illustrating the theory of determination of spectral similarity by an analog system wherein energy may be transferred from one excited system to another if the corresponding spectra of the transferring and receiving then excited system are sufficiently similar. The transfer establishes an association. See association mechanism, basis of reasoning, energy difference between the final and initial nuclear states, and interaction of ultrasound with Mossbauer gamma rays given above.

Matrix Method of Analysis of Mills- A DNA sequence is a linear representation of information or pattern. A Matrix Method of analysis was provided by Appellant in SUB APPENDIX IV and V to provide further understanding of how a linear sequence of information may be sampled and analyzed to determine the correct linear order of the information. The linear order of nucleotides are generalized to represent information that is formatted in a certain order. An exemplary order generalization from position along the strand to relative position in time was presented as background. See nested sets of sequential subsets of random DNA fragments above.

series representing the nucleotides- Does not appear in the present application. Appellant postulates that Examiner Tadayan may be referring to exemplary background provided by Appellant. In an embodiment, Fourier series representing information is ordered according to

some criterion. The establishment of an order of the information is achieved by generalizing the method of determining the order of nucleotides in a DNA strand to determining the order of Fourier components of the Fourier series. In this case, smaller Fourier series samples of the larger original Fourier series or string may be obtained with a filter and may be treated analogously to nucleotides in the implementation of the method of ordering. See nested sets of sequential subsets of random DNA fragments above. Also see page 16, line 16 to page 21, line 5.

transducer string- At page 12, lines 3-24, the application teaches, "Transducer strings may be created by obtaining a Fourier series from at least two selected transducers and adding the Fourier series. Transducers that are active simultaneously may be selected. The transducer string may be stored in a distinct memory location of the memory. The characteristic modulation, having a frequency within the band in Fourier space can be represented by $e^{-j2\pi f t_0}$ which corresponds to the time delay $\delta(t-t_0)$ wherein f is the frequency variable, t is the time variable, and t_0 is the time delay.

Recalling any part of the transducer string from the distinct memory location may thereby cause additional Fourier series of the transducer string to be recalled. In other words the Fourier series are linked. Fourier series, in addition to those of transducer strings may be linked. In order to achieve linking of the Fourier series, the system generates a probability expectation value that recalling any part of one of the Fourier series from the memory causes at least another Fourier series to be recalled from the memory. The system stores the probability expectation value to memory. The system generates a probability operand, usually having a value selected from a set of zero and one, based on the probability expectation value. The system recalls at least another Fourier series from the memory if the operand is one. The probability expectation value may increase with a rate of recalling any part of any of the Fourier series."

weighting factors- Used as a method to activate the system based on past activation rates. At page 2, lines 9-14, the application teaches, "The system also includes a Predominant Configuration Layer that receives multiple ordered strings from the memory, forms complex ordered strings comprising associations between the ordered strings, and stores the complex ordered strings to the memory. The components of the system are active based on probability using weighting factors based on activation rates." In one embodiment, the

activation process is akin to an operating system kernel in a forever loop. See page 21, line 9 to page 22, line 33 of application.

Poissonian probability- Associations are formed between Fourier series by filtering the Fourier series and by using a spectral similarity between the filtered Fourier series to determine the association based on probability. At page 14, lines 4-7, the application teaches, "The probability distribution may be Poissonian. Thus, the probability expectation value can be based upon Poissonian probability. The probability expectation value may be characterized by

$$\prod_s \left[p_{\uparrow_s} + \left(P - p_{\uparrow_s}\right) exp\left[-\beta_s^{-2} \left(\frac{1 - cos\, 2\phi_s}{2} \right) \right] cos\left(\delta_s + 2\, sin\, \phi_s\right) \right]"$$

At page 13, lines 10-26, the application teaches the use of probability to make an association and form a string of Fourier series representing the associated information, "A spectral similarity value is output from the spectral similarity analyzer 36 and input to a probability expectation analyzer 38. The probability expectation analyzer 38 determines a probability expectation value based on the spectral similarity value. The probability expectation value output from the probability expectation analyzer 38 is input to a probability operand generator 40. The probability operand generator 40 generates a probability operand value of one or zero based upon the probability expectation value. The probability operand value is output to a processor 42. If the probability operand value is zero, the processor 42 sends another Fourier series from the Fourier series section 32 of the temporary memory section 28 to the filter 34 and begins the process again. If the probability operand value is one, the filtered Fourier series and the other Fourier series are added to form a string and the string is stored in a string memory section 44."

Based upon the foregoing recitations, Appellant earnestly believes that contrary to the strained views of Examiner Tadayon, the terms identified on page 5 of the Office Action are more than adequately defined in the present specification to enable one skilled in the art to practice the claimed invention without undue experimentation.

Examiner Tadayon is further mistaken as to another allegation he makes on page 5 of the Office Action, at paragraph (II), that "[i]t is not clear how exactly the Fourier series is obtained from the DNA sequences." Contrary to the Examiner's premise, the disclosed

invention does not obtain a Fourier series from a DNA sequence. A DNA sequence is a linear representation of information or a pattern. A Matrix Method of analysis is provided in SUB APPENDIX IV and V to provide further understanding of how a linear sequence of information may be sampled and analyzed to determine the correct linear order of the information according to generalize criteria. The nucleotides are generalized to represent information that is formatted in a certain order. An exemplary order generalization from position along the strand to relative position in time is disclosed. See nested sets of sequential subsets of random DNA fragments above.

Other allegations put forth by Examiner Tadayon similarly have no basis in fact. For example, on page 5 of the Office action, at paragraph (III), Examiner Tadayon alleges that "[i]t is not clear how adding at least two of the Fourier components to form at least one Fourier series result in the recognition of the pattern." Appellant submits that the adding of at least two of the Fourier components to form at least one Fourier series is input to the determination of the spectral similarity between this Fourier series and at least another such Fourier series that represents a test pattern to be recognized in the input Fourier series if it exists. Such a determination according to the methods taught by Appellant results in the recognition. Specifically, based on the spectral similarity between the two Fourier series, the recognition of a pattern in an input Fourier series occurs when the probability operand returns a desired value, such as a one versus a zero. See page 2 lines 15-32; page 12 lines 25-34; page 13 lines 1-26 of the application.

In yet another unfounded allegation, on page 5 of the Office Action, at paragraph (IV), Examiner Tadayon alleges that "[i]n Fourier analysis, the phase and high frequency components are not treated properly. This makes the analysis incomplete. Thus, the specification lacks proper teaching." The problem here lies in the Examiner's failure to appreciate that the claimed invention does not involve Fourier transforming the input as a function of time into a conventional Fourier transform. Therefore, the Examiner's allegations regarding the improper treatment of the phase and high frequency components of a Fourier analysis are irrelevant. See page 7, line 35 to page 12, line 10 of the present application.

Examiner Tadayon's confusion on this matter is further reflected by his statement at the interview that the data set input to the system of the present invention must have the property of orthogonality in order that it could be Fourier transformed into a Fourier series.

As explained above, data sets are not required to be orthogonal. In fact, such a requirement would be nonsensical since real-world data is not orthogonal. Examiner Tadayon is obviously confused, since the present invention as claimed does not teach Fourier transforming the input data as a waveform into a Fourier series with the requirement of orthogonal components. See Siebert, W. McC., Circuits, Signals, and Systems, The MIT Press, Cambridge, Massachusetts, (1986), pp. 364-384 (Exhibit 4). In one embodiment, Appellant teaches FORMATTING the data as parameters ρ_{0_m} and $N_{m_{\rho 0}}$ of each component of a Fourier series in Fourier space. This format permits the determination of the spectral similarity of one set of data so formatted and another formatted in the same manner. In another embodiment, the data is simply formatted in terms of a special memory structure that determines the parameterization of a formula for determination of the spectral similarity of one set of data and another. See page 13, line 1 to page 16, line 15 and page 45, lines 3-8 of the application.

Examiner Tadayon is further mistaken regarding the disclosure relating to sampling and modulating the Fourier series in Fourier space with the Fourier transform of the delayed Gaussian filter, which corresponds to filtering in the time domain. In the Interview Summary, Examiner Tadayon states: "Thus, the filter defined on page 14 line 1 is not actually filtering process in the conventional meaning of Fourier analysis. It is only the multiplication of a "function" times a "parameterized summation of trigonometric functions" as shown in line 17 of page 14." This statement is both irrelevant and incorrect. An aspect of Appellant's invention of the Fourier series being in Fourier space is novel and, thus, is not required to conform with the conventional meaning of Fourier analysis. Furthermore, the novel filtering aspect of the present invention is also not required to conform with conventional filtering. However, the filtering happens by chance to conform with a conventional understanding of filtering, as follows. The Fourier series in Fourier space taught by Appellant represents a spectral function that by definition has a corresponding inverse Fourier transform in the time domain. A derivation of an exemplary Fourier series in Fourier space of the present invention is disclosed in the Sub Appendix I, starting on page 55 of the application. Appellant teaches the multiplication of the Fourier series in Fourier space by the Fourier transform of a delayed Gaussian filter as disclosed on page 14, line 1 and the term Gaussian filter discussed above. This conforms with the conventional signal processing meaning of

filtering as disclosed in Siebert, W. McC., Circuits, Signals, and Systems, The MIT Press, Cambridge, Massachusetts, (1986), pp. 364-384, cited on page 106 of the present application (Exhibit 4). A description of the novel filtering method of the present invention is described with reference to the term similarity between at least 2 filtered and unfiltered Fourier series discussed fully above. A derivation of the sampling and modulation of the Fourier series in Fourier space with the Fourier transform of a time delayed Gaussian filter according to the present invention is disclosed in Sub Appendix II, starting on page 60 of the application.

In sum, the Appellant submits that the easy-to-follow flow charts, the extensive written description, and supporting theory and mathematics in the Appendices, provides more than sufficient disclosure to enable one skilled in the art to make and use the invention as claimed without undue experimentation. Therefore, claims 51-322 fully comply with 35 U.S.C. § 112, first paragraph, and should be allowed.

III. **Claims 51-322 are patentable under 35 U.S.C. § 102(b) over Bates**

In the Office Action dated March 14, 2000, the Examiner rejected all claims 51-322 under 35 U.S.C. § 102, as being anticipated by Bates. Appellant respectfully submits that the Examiner's rejection is completely misplaced and that all claims 51-322 are patentable over Bates for the following reasons.

For a reference to anticipate under section 102, each and every limitation of the claim "'must be identically shown in a single reference.'" In re Bond, 15 USPQ 2d 1566, 1567 (Fed. Cir. 1990) (quoting Diversitech Corp. v. Centrum Steps, Inc., 7 USPQ 2d 1315, 1317 (Fed. Cir. 1988). To be sustainable, a rejection under Section 102 requires that the Examiner demonstrate how each element of each claim is identically shown in the cited reference.

Examiner Tadayon has failed to demonstrate how any element in any of the pending claims is shown in Bates. Examiner Tadayon's admitted excuse that he had insufficient time to adequately learn the invention due to his extensive training duties

does not alleviate him of his duty to show how each an every element of Appellant's claims are anticipated by Bates, as required by Section 102.

Incredibly, Examiner Tadayon offers the following additional excuse for not providing a meaningful and complete anticipation rejection:

> "Since the teaching of the specification is incomplete and inadequate, the claims are not fully supported by the specification, and the examiner cannot fully understand the meaning and scope of the claims. In view of the 112-1st rejection mentioned above, a meaningful and complete comparison between the claims and prior art cannot be done."

This statement defies all logic and is an affront to the fair treatment patent applicant's have a right to expect in the conduct of the patent examination process. First, Examiner Tadayon bootstraps his admitted lack of time to adequately study the specification and lack of expertise in the field of artificial intelligence to allege that the disclosure is inadequate under 112, first paragraph, so as to sufficiently understand the invention. He then takes this bootstrap argument one step further by alleging that the claimed invention is anticipated by the prior art, but refuses to articulate his reasons why because the claimed invention is allegedly not adequately disclosed.

Put simply, Examiner Tadayon's "eleventh-hour" allegation that the specification is "incomplete and inadequate" - - after two years of examination by three Examiners and confirmation of allowability by the Section 101 panel of three senior Examiners - - is outrageous. As made clear from the preceding, extensive discussion of the disclosure in response to the Section 112 rejection, Appellant has gone far beyond the requirements of Section 112 by disclosing examples, flow charts and mathematical derivations in the Appendices and, thus, has provided a complete and adequate disclosure that would enable one skilled in the art to practice the invention without undue experimentation. Examiner Tadayon's assertion of incompleteness and inadequacy as a basis for rejecting claims as anticipated by Bates is wholly without merit and should itself be rejected out of hand.

Examiner Tadayon bases his Section 102 rejection upon a haphazard collection of key words and phrases from Bates, but fails to articulate any cogent explanation as to the meaning of these words and phrases or how they anticipate the elements of the presently claimed invention. His citation of various features of Bates that are not elements of the claimed invention, or otherwise required thereby, further demonstrate his lack of familiarity with the subject matter of the present application and further undermines the Section 102 rejection under consideration.

For example, Examiner Tadayon cites Bates for the proposition, "It can be used for biomedical systems analysis, speech processing, and the like (column 1, lines 21-28.)" The Examiner, however, fails to relate that passage to the context of the actual disclosure in column 1, lines 16-25 of Bates:

> "The analysis and synthesizing of complex waveforms is a well developed art and has application to a large number of fields. For example, the analysis of acoustical signals having complex waveforms produced by one or more spaced sources is well known. Similarly, analysis of signal waveforms of electrical signals, seismic signals, and other signals is well known with application in speech processing, environmental sensing, biomedical, signal analysis, and the like."

From the context of the actual disclosure, it is apparent that the language in Bates cited by the Examiner merely provides background that does not anticipate the present invention. Nor does this background cover the general scope of the present invention, which is capable of pattern recognition, generally referred to as "artificial intelligence," and which is clearly distinguishable from the signal processing of Bates. Examiner's Tadayon's reliance on certain catch phrases and words lifted from Bates is unfounded and cannot possibly form the basis for anticipating Appellant's claims. For this reason alone, the Section 102 rejection of all claims should be withdrawn.

Other passages in Bates cited by the Examiner make clear that this reference is directed to subject matter divorced from the present invention. For instance, Examiner Tadayon asserts that Bates, "describes wavelet, modulation, spectrum analysis, and spectral pattern (column 5 lines 9-68.)" A careful reading of Bates at column 5, lines 9-11, however, discloses that, "From the above, it is apparent that a crucial requirement for the analysis system is that the system must identify the epoch τ_k as accurately as possible." In contrast, the present invention has no such requirements. Further, in the present invention, no periodicity of the data is required. Neither is the identification of the epoch (referring to time of onset of a periodic function), which is a requirement of Bates. Bates' requirement of nulls in the data stream as a function of time is also not a requirement in the present invention. For these reasons alone, the Section 102 rejection of all claims should be withdrawn.

With respect to the Examiner's reliance on the term "modulation," Bates does not use that term in the section cited by Examiner Tadayon (column 5 lines 9-68). "Modulation" only appears in a publication referenced by Bates; no use of modulation is taught here. Specifically Bates discloses, (column 5 lines 23-35), "Therefore, each ripple in the waveform of FIG. 1 is a feature which results from either an excitation impulse or an oscillatory response. These features can be represented as real and complex zeros in the time domain as described, for example, in the publication by H. B. Voelcker, "Toward a Uniform Theory of Modulation," Part I: Phase-Envelop Relationships, IEEE Proceedings, Volume 54, March, 1966, pp. 340-353 and Part II, Zero Manipulation, IEEE Proceedings, May 1966, pp. 735-755. Also see U.S. Pat. No. 3,510,640 to H. B. Voelcker, entitled "Methods and Apparatus for Interpolation and Conversion of Signals Specified by Real and Complex Zeros"." Thus, Examiner Tadayon's reliance on the teaching of "modulation" in Bates is unfounded and should be withdrawn. For this reason alone, the Section 102 rejection of all claims should be withdrawn.

The Examiner further misapplies Bates, noting that, "It includes amplitude modulation circuits (column 32 lines 8-23.)" However, the use of modulation by Bates is with reference to a waveform synthesizer according to a composer program, which requires the features of periodicity, epoch, and zeros in the signal. Again, these feature are not requirements of the present invention and, thus, have no bearing on the patentability thereof. See column 31

lines 34-68. For this reason alone, the Section 102 rejection of all claims should be withdrawn.

The term "spectrum analysis" cited by Examiner Tadayon is also not disclosed in the section referenced by the Examiner. Bates in fact teaches that his signal processing method employs a non-spectral analysis approach. See column 2, lines 51-55. Furthermore, this term is irrelevant with respect to the present invention, since the claimed invention as recited in claims 51-117, 119, 127-155, 160-227, 229, 237-265, 271-280, 282, 288, 290-298, 301, 306 and 313-322 uses Fourier series in Fourier space and does not require analysis of the spectrum determined from the data by a direct Fourier transform of the signal as a function of time. For this reason alone, the Section 102 rejection should be withdrawn.

Bates further teaches that his signal-processing invention does not utilize Fourier or spectral analysis (See column 1, lines 41-57) and further that his signal processing method employs a non-spectral analysis approach. See column 2, lines 51-55. Contrary to Bates, the claimed invention, as recited in claims 51-156, 160-266, 270-284, 290-298, and 304-322, relies on the use of Fourier series in Fourier space and, thus, could not possibly be anticipated by Bates. For this reason alone, the Section 102 rejection of these claims should be withdrawn.

Similarly, claims 51-117, 119, 127-155, 160-227, 229, 237-265, 271-280, 282, 288, 290-298, 301, 306 and 313-322 all recite the step of determining respective "spectral" similarities. Since Bates teaches his invention does not employ spectral analysis, these claims cannot be anticipated by Bates. For this reason alone, the Section 102 rejection of these claims should be withdrawn.

Examiner Tadayon also cites the term "spectral pattern," which is different from the term "spectral similarity" recited in claims 51-117, 119, 127-155, 160-227, 229, 237-265, 271-280, 282, 288, 290-298, 301, 306 and 313-322 . Bates, however, uses the term, "spectral pattern" with reference to the interpretation of his Equation (3) as "the instantaneous 'residue' of the spectral pattern of the signal f(t.)" and, thus, that term anticipates nothing in the presently claimed invention. (See column 5, lines 54-68.)

The pattern of "spectral analysis" as used by Bates refers to his method of searching for zeros in the data as a function of time to determine the periodicity and the epoch as compared to conventional methods of performing a Fourier transform on the data stream and analyzing the "pattern of a spectral envelop". (See column 34, line 63 to column 36, line 68.) Specifically, at column 34, lines 63-68, Bates discloses, "To demonstrate the advantages of the invention, there is next described a comparison of a waveform analysis by a novel invention, as compared to spectrum analysis techniques, and to explain and illustrate the ways by which the Aural Retina and Fourier analysis each obtain similar information for identifying a signal." In contrast, the present invention, as recited in all claims 51-322, does not rely on performing a Fourier transform operation on a data stream, as do prior art methods. The present invention also does not require or determine the periodicity, epoch, and zeros by determining "vector measurements on each waveform zero" of the data, as required by Bates (column 36, lines 66-67). The present invention further does not require the determination of an autocorrelation to analyze a signal as a function of time to determine the periodicities, zeros, or epochs. For these reasons alone, the Section 102 rejection of all claims should be withdrawn.

Bates further teaches that "since the vector measurements taken at each waveform zero are independent, they can be treated by statistical procedures to accomplish the optimum detection processes that are usually associated with frequency domain techniques." See column 36, lines 66-68 and column 37, lines 1-2. Bates describes "the derivative or rate-of-change-vector" at column 5, line 54. "Vector measurements taken at each waveform zero" refers to a normalized derivative given by Equation (3) of a complex waveform given by Equation (1). Bates teaches "using the Periodicity Sorting Matrix, the zero samples can be established to identify periodicities, randomness, and epochs of time series." (See column 36 lines 19-22.) The present invention does not require "vector measurements at zeros according to Equation (3) of Bates. For this reason alone, the Section 102 rejection of all claims should be withdrawn.

Additionally, Bates does not teach the use of a probability expectation value, probability distribution or the use of probability operands as recited in claims 51-155, 157-265, 267-269, 271-303, 307-312 and 317-322. For this reason alone, the Section 102 rejection of these claims should be withdrawn.

Examiner Tadayon further cites Bates based on the premise that "[i]t deals with harmonic ripples, inference, and periodicity sorting matrix (column 37 lines 20-42.)" This passage, however, merely discloses a means to identify periodicity and epoch in the waveform comprising the signal as a function of time when multiple signals add or interfere in time. Again, the present invention does not require the searching for periodicity or epoch in the waveform comprising the signal as a function of time. The data may have no periodicity. For this reason alone, the Section 102 rejection of all claims should be withdrawn.

A further distinguishing feature is that Bates requires a data stream over time. The present invention does not require of a data stream over time. For this reason alone, the Section 102 rejection of all claims should be withdrawn.

For all of the foregoing reasons, Appellant submits that all claims 51-322 are patentable over Bates and should be allowed.

Conclusion

In view of the arguments presented herein above, all of the pending claims 51-322 fully comply with Sections 101, 112 and 102. Accordingly, Appellant respectfully requests that the Board withdraw the Examiner's rejections of claims 51-322 and allow all claims.

Respectfully submitted,

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